24075

Well Evaluation Report
Final

April 29, 1994

EG&G ROCKY FLATS

EG&G Rocky Flats, Inc.
P.O. Box 464
Golden, Colorado 80402

1/836

1/839

1/839

SW-A-003839

Table of Contents

2

3

3

4

List of Tables

5

List of Tables (cont.)

List of Figures

1

List of Plates

8

9

9

10

10

12 12

15

15

List of Appendices

16

List of Acronyms

AEC	Atomic Energy Commission
AIP	Agreement in Principle
ARAR	Applicable or Relevant and Appropriate Requirement
CAS	chemical abstract service
CCR	Code of Colorado Regulations
CCl4	carbon tetrachloride
CDH	Colorado Department of Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
CLP	Contract Laboratory Program
cm/cm	centimeter per centimeter
cm3/cm3	cubic centimeter per cubic centimeter
cm/sec	centimeters per second
CWA	Clean Water Act
CWQCC	Colorado Water Quality Control Commission
CWQCD	Colorado Water Quality Control Division
DNAPL	dense nonaqueous phase liquids
DOE	U.S. Department of Energy
EPA	Environmental Protection Agency
ENR	Engineering News Record
ERDA	Energy Research and Development Administration
FFCA	Federal Facilities Compliance Agreement
FR	Federal Register
GC	gas chromatography
GC-MS	gas chromatography-mass spectroscopy
GPMPP	Groundwater Protection and Monitoring Program Plan
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
GWAP	Ground Water Assessment Plan
IAG	Interagency Agreement
IHSS	Individual Hazardous Substance Site
MCL	maximum contaminant level
mg/L	milligrams per liter
MTBE	methyl-tertiary-butyl ether

17

17

NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NL	new landfill
No.	Number
NPDES	National Pollutant Discharge Elimination System
OU	operable units
PAHs	polyaromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
pCi/L	picocuries per liter
PQL	practical quantification limit
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCRA-C	RCRA-characterization
RCRA-S	RCRA-statistics
RFEDS	Rocky Flats Environmental Database System
RFI/RI	RCRA facility investigation/remedial investigation
RFP	Rocky Flats Plant
SOPs	Standard Operating Procedure
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
TDS	total dissolved solids
UTL	upper tolerance limit
VOC	volatile organic compound
WAPP	well abandonment program plan
WARP	well abandonment and replacement program
WER	well evaluation report
WWE	Wright Water Engineers
µg/L	micrograms per liter
1,1,1-TCA	1,1,1-trichloroethane
1,1,2-TCA	1,1,2-trichloroethane
1,1-DCA	1,1-dichloroethane
1,2-DCA	1,2-dichloroethane
1,2-DCE	1,2-dichloroethene

18

18

EXECUTIVE SUMMARY

The purpose of the 1993 well evaluation program is to determine whether the existing groundwater monitoring program at the Rocky Flats Plant (RFP) meets regulatory monitoring requirements and site-wide programmatic goals. This report has the following specific objectives:

- Document the current network of monitoring wells.
- Review existing federal and state statutes, legal agreements, and DOE orders and compile a document detailing the composite requirements for groundwater monitoring at RFP.
- Illustrate the spatial relationship of well-screen intervals to known water-bearing units, potential groundwater flow paths, and other wells.
- Display concentrations of selected analytes in groundwater on concentration contour maps.
- Produce geochemical trend plots that display temporal variability in concentrations of selected analytes in groundwater.
- Analyze hydrogeologic and geochemical data and technical, regulatory, and special purpose considerations for groundwater monitoring.
- Evaluate the current groundwater sampling and analysis program and classify wells based on their specific purpose.
- Present recommendations for a well network, sampling frequency, and analytical suite that will satisfy technical objectives and regulatory requirements and provide an integrated site-wide groundwater monitoring program.

Site-wide assessments of geology, groundwater flow patterns, occurrence and distribution of contaminants in groundwater, and migration pathways provide a foundation for technical recommendations. Because of the broader, site-wide perspective of this report, information and interpretations presented in this document many not reflect the detail presented in operable unit-specific documents.

A conceptual model for groundwater flow was developed using geologic cross sections, groundwater potentiometric surfaces, vertical hydraulic gradients, flow directions, hydraulic conductivities of aquifer materials, and known groundwater/surface water interactions. The conceptual model of groundwater flow was used to identify areas of potential concern where additional groundwater monitoring may be warranted.

Groundwater geochemical data were analyzed using concentration contour maps and trend plots to determine the extent and magnitude of and temporal trends in groundwater contamination at RFP. Based on the quality and quantity of available data, concentration contour maps were constructed using data from two quarters of 1990 and 1992. Concentration trend plots were constructed using data from 1989 through 1992. The following conclusions were reached:

- The spatial distribution of contaminant plumes has not significantly changed from 1990 to 1992. Increased data in 1992 resulted in greater resolution of plume boundaries in some cases.
- Preliminary data indicate that some seasonal variation in the concentration of selected analytes in groundwater may occur.
- The spatial distribution of contaminant plumes in unconsolidated surficial deposits and shallow bedrock is similar, suggesting that these lithostratigraphic units are hydraulically connected, have similar permeability, and exhibit comparable hydraulic gradients.

The review of regulatory requirements and geologic, hydrologic, and geochemical data indicate that regulatory monitoring requirements and site-wide programmatic monitoring objectives are generally being met. However, modifications can be made to improve site-wide monitoring at RFP. The results of geologic, hydrologic, and geochemical data analyses were used to develop recommendations for the design of a groundwater monitoring program consisting of a monitoring network, sampling frequency, routine analytical suites, and a point of compliance. The proposed monitoring program fulfills technical objectives and satisfies regulatory requirements.

Routine monitoring of the groundwater potentiometric surface is recommended to characterize spatial and temporal variations in flow directions, flow velocities, and hydraulic gradients. Quarterly monitoring is recommended for all existing and newly installed wells at RFP. Monthly monitoring of select wells is recommended to evaluate the performance of Interim Measure/Interim Response Actions (IM/IRAs) and to obtain hydrogeologic data to support site-wide computer modeling programs.

A two-component groundwater-quality monitoring network consisting of a technically based Semiannual Monitoring Network and a regulatory-based Quarterly Monitoring Network is recommended. The proposed Semiannual Monitoring Network is based on the conceptual model for groundwater flow and provides for continued monitoring of known sources, early detection of releases, and the ability to monitor predicted migration pathways, delineate the nature and extent of contamination, quantify migration rates, and describe temporal trends. Wells from areas of both current and potential concern were identified for inclusion in this network. The proposed Semiannual Monitoring Network comprises a total of 300 existing wells. This network includes 142 existing wells that should be sampled semiannually and all 158 existing wells in the proposed Quarterly Monitoring Network. Installation of additional wells is also warranted to monitor areas of potential concern. The proposed Quarterly Monitoring Network includes all wells for which sampling is required by regulatory statutes or agreements and comprises 158 existing wells. There are 114 existing wells that are not included in either the Semiannual or Quarterly Monitoring Network and are recommended for elimination from the sampling program.

Three analytical suites and a process for their selection at each well are proposed. The comprehensive suite is extensive and intended to determine the presence or absence of a broad list of groundwater contaminants, including all constituents having applicable groundwater and surface water standards. Two rounds of comprehensive sampling and analysis are recommended for each well. The RFP-related suite addresses the majority of analytes and analyte groups that are associated with past and present RFP production and waste generation activities. The RFP-related suite should be applied to samples at a large number of wells on a semiannual basis. A more limited, location-specific suite may be warranted to meet the purpose of some wells. Periodic review of the purpose of each well is recommended to select an appropriate analytical suite.

Based on regulatory, technical, and health-protective considerations, a site-wide point of compliance at the eastern boundary of RFP at Indiana Street is recommended. Monitoring at the point of compliance should be coupled with information from the proposed Semiannual Monitoring Network and concurrent Quarterly Monitoring Network to evaluate contamination upgradient of the eastern boundary.

In addition to recommendations for a groundwater monitoring program, additional characterization and data evaluation activities are recommended to further characterize the geologic, hydrogeologic, and geochemical aspects of the conceptual model for groundwater flow and contaminant transport presented in the report.

1. INTRODUCTION

Groundwater at the Rocky Flats Plant (RFP) has been monitored since 1954 (WWE, 1993a). The monitoring system has grown from a small number of wells designed to detect leakage from the Solar Evaporation Ponds, to approximately 600 wells and piezometers. Monitoring wells have been added to the system over the years to meet groundwater protection and monitoring requirements of specific federal and state environmental protection laws and U.S. Department of Energy (DOE) or Atomic Energy Commission (AEC) orders.

1.1 Purpose of Report

The purpose of the well evaluation program is to determine if the existing groundwater monitoring program at RFP meets regulatory monitoring requirements and sitewide programmatic monitoring goals. Programmatic monitoring goals include suitability of well placement with respect to known sources of contamination, ability to provide early detection of releases from known and unknown sources, ability to intercept/monitor predicted migration pathways, ability to delineate nature and extent of contamination, and ability to quantify contaminant migration rates and temporal trends in contaminant concentrations.

Specific objectives of this report are as follows:

- Document the current monitoring network with respect to number, location, and historical purpose of wells.
- Compile well data sheets that specify installation details, location, purpose, water-level data, analytical suite for groundwater samples, and geochemical data for each well at RFP.
- Review existing federal and state statutes, legal agreements, and DOE orders and compile a composite requirements document under which the monitoring program will be scoped.
- Construct geologic cross sections and fence diagrams to show the spatial relationship of screened intervals to known water-bearing units, potential groundwater flowpaths, and other wells.

23

- Construct isopleth maps that display geochemical concentrations of selected analytes in groundwater for the second and fourth quarters of 1990 and 1992.

- Produce geochemical trend plots that display temporal variability of the concentrations of selected analytes.

- Analyze hydrogeologic and geochemical data and scientific/technical, regulatory, and special purpose considerations for groundwater monitoring at RFP.

- Evaluate the current groundwater sampling and analysis program and classify wells based on purpose considerations discussed above.

- Present recommendations of wells to sample, sampling frequencies, and analytical suites that will satisfy the scientific/technical, regulatory, and special purpose considerations; provide an integrated sitewide groundwater monitoring network; and meet programmatic monitoring goals.

Because of the broader sitewide perspective, information and interpretations presented in this document may not reflect the detail presented in operable unit - specific documents.

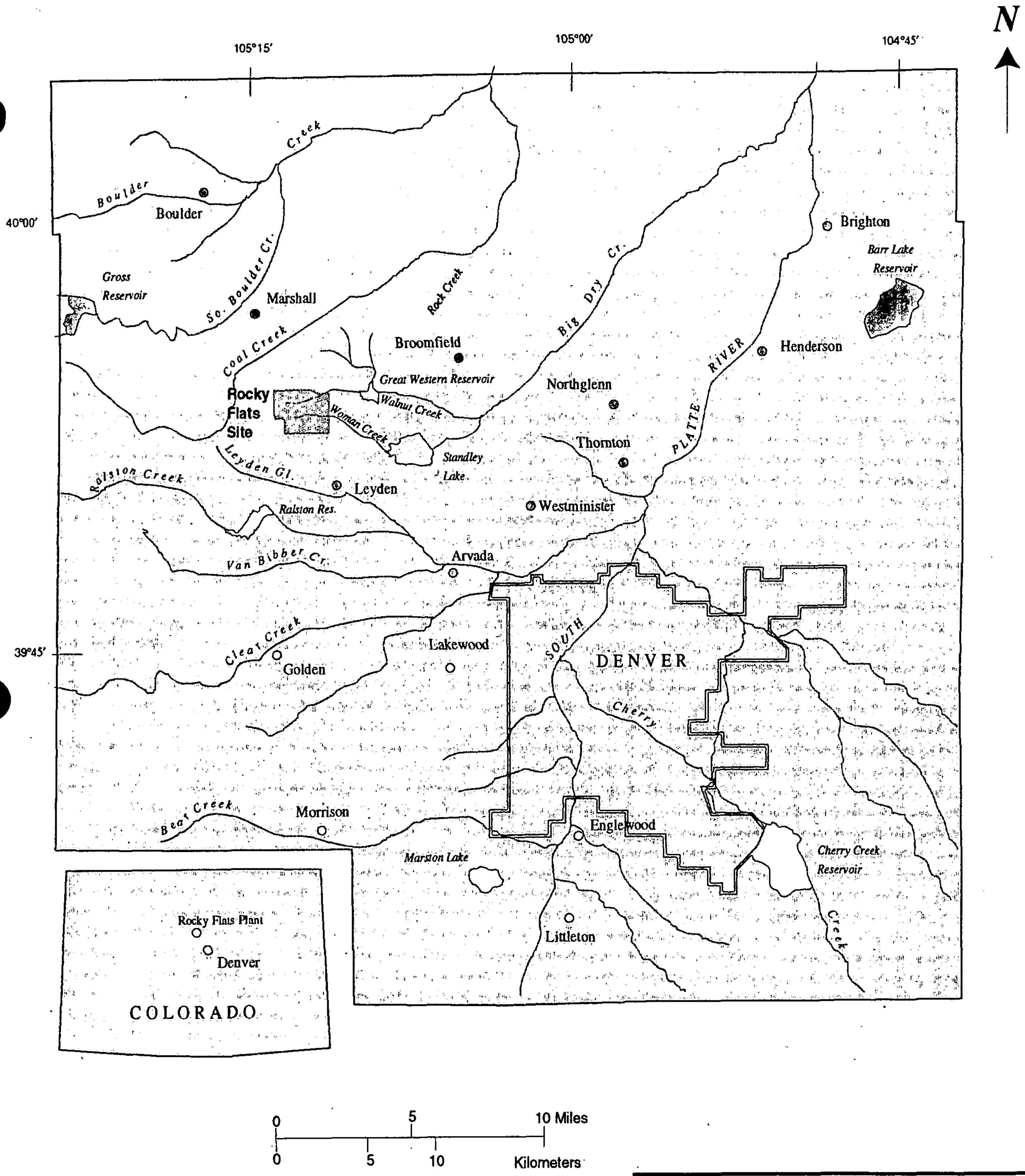
1.2 Facility Background and Plant Operations

RFP is a government-owned, contractor-operated facility that was part of the nationwide nuclear weapons complex. RFP is located approximately 16 miles northwest of Denver, in northern Jefferson County, Colorado, (Figure 1-1) and covers approximately 6,550 acres of land in Sections 1 through 4, and 9 through 15 of Township 2 South, Range 10 West of the 6th principal meridian. Major buildings are located within the industrial area, which covers approximately 400 acres in the center of RFP. The industrial area is surrounded by a buffer zone of approximately 6,150 acres. Current environmental monitoring programs encompass both the industrial area and the buffer zone.

RFP was operated for the AEC from its inception in 1951 until the AEC was dissolved in January 1975. At that time, responsibility for the plant was assigned to the Energy Research and Development Administration (ERDA), which in January 1977 was succeeded by the DOE. Dow Chemical, USA (an operating unit of Dow Chemical Company) was the prime operating contractor of the facility from 1951 through

24

24



EG&G ROCKY FLATS

Rocky Flats Plant, Golden, Colorado

Location of Rocky Flats Site

Well Evaluation Report

Date: April 1994	Figure 1-1

M\ES\RFP & Vicinity Map BJM 11-11-93

25

June 10, 1975. Rockwell International became the prime operating contractor of the facility on July 1, 1975, and held this position until December 31, 1989. EG&G Rocky Flats, Inc., the current operating contractor, assumed responsibilities of this position on January 1, 1990.

The mission of RFP is currently in transition from a defense production facility to one whose future mission includes environmental restoration, waste management, maintenance of a production contingency, and eventual decontamination and decommissioning. Until January 1992, RFP was operated as a nuclear weapons research, development, and production complex. The plant fabricated nuclear weapons components from plutonium, uranium, and nonradioactive materials, including beryllium and stainless steel. Parts manufactured at RFP were shipped offsite for final assembly. Support activities at RFP included chemical recovery and purification of recyclable transuranic radionuclides, and research and development in metallurgy, machining, nondestructive testing, remote engineering, chemistry, and physics. Both radioactive and nonradioactive wastes were generated by the production processes at RFP. In the past, storage and disposal of hazardous and radioactive wastes occurred onsite. The preliminary environmental assessment performed under the environmental restoration program identified locations of past onsite storage and locations of potential environmental contamination.

1.3 Overview of the Current Groundwater Monitoring Program at RFP

The current sitewide groundwater monitoring program is an amalgamation of several separate monitoring programs that address distinct regulatory-compliance or site-investigation objectives. Most of the wells at RFP were not installed as part of an integrated sitewide monitoring network but to fulfill a site-specific data need. As a result, wells are currently classified as follows:

- Resource Conservation and Recovery Act (RCRA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Background Characterization
- Boundary/Point of Compliance
- Special Purpose

Well locations and current classifications are shown in Plate 1-1. RCRA-compliance wells are in place at the three RCRA-regulated units at RFP (Solar Evaporation Ponds, West Spray Field, and Present Landfill). Wells at these RCRA units serve two purposes: upgradient and downgradient RCRA-boundary wells used to obtain chemical data for statistically assessing potential releases from the units, and RCRA-characterization wells used to evaluate the nature and extent of contamination and contaminant migration rates in accordance with the alternate and assessment programs for the units. CERCLA characterization wells have been installed at operable units (OUs) that have been or are currently under investigation. Each of these wells has a specific purpose related to the objectives of remedial investigations at the OU, and long-term (more than 2 years) monitoring of these wells for characterization purposes is usually not required. Figure 1-2 shows Individual Hazardous Substance Site (IHSS) locations within OUs. Wells classified for background characterization have been used to provide background groundwater quality data. Boundary wells have been installed to monitor groundwater quality as it leaves the site or at other points of compliance. Special purpose wells have been installed for use in general site characterization programs, detecting leaks or other chemical releases to the environment, specific investigations such as the nitrate contamination investigation in the Solar Evaporation Ponds area, and monitoring the performance of dams or other engineered structures.

The analytical suite for groundwater samples (the "standard suite") consists of the following analytes and analyte groups: Target Compound List (TCL) volatile organic compounds (VOCs); water quality parameters; nitrate/nitrite as nitrogen; gross alpha, gross beta, uranium, cesium, radium, and strontium (dissolved); Contract Laboratory Program (CLP) Target Analyte List (TAL) standard and additional metals (dissolved); tritium, plutonium, americium (total); cyanide; orthophosphate; semivolatile organic compounds (SVOCs); and polychlorinated biphenyls (PCBs)/pesticides.

1.4 Initial Evaluation of the Groundwater Monitoring Network

Only recently has an effort been made to evaluate the groundwater monitoring program in terms of sitewide regulatory requirements, plant protection objectives, characterization objectives, and viability. In 1989, DOE performed an internal audit that identified the potential for improperly constructed or damaged wells and piezometers to serve as conduits for contaminant movement into, within, or between groundwater and soil. As a result of this finding, as well as to ensure the integrity of water-level and water-quality data, the well abandonment and replacement program (WARP) was initiated. WARP involved preparation of a well abandonment program plan (WAPP), (EG&G, 1990a), preparation of a well evaluation report (WER),(EG&G, 1991a) and development of standard operating procedures for abandonment of groundwater monitoring wells and piezometers.

The WAPP, completed in late 1990, outlined goals and objectives of the WARP, and defined criteria for evaluating the usefulness and viability of RFP wells and piezometers. The purpose of the well evaluation report (1991 WER) (EG&G, 1991a), submitted to DOE in January of 1991, was to identify wells and piezometers at RFP that failed to meet criteria for viability and/or usefulness for the groundwater monitoring program. These criteria (defined in the WAPP) were applied to the 353 known wells in existence at RFP.

Wells were considered viable only if their construction, current conditions, and level of documentation met the requirements for newly installed wells at RFP. Viability criteria included conditions that might compromise the integrity of groundwater samples or water-level data. The criteria for identifying nonviable wells included one or more of the following: well installed prior to 1986 (because they did not meet the requirements of monitoring wells), incomplete construction details, physical or mechanical damage to the well, groundwater pH greater than 10 (likely as a result of cement grout contamination), total-depth discrepancies in the data, casing incompatibility (such as galvanized steel or low carbon steel casing), foreign objects in the well, well location subject to flooding, and missing sealant materials.

Wells were considered useful only if the information gained from them was necessary for meeting the goals of the groundwater monitoring program or other programs at RFP. Criteria for identifying non-useable wells included one or more of the following: insufficient water, duplicate or redundant wells, incorrectly screened wells, and well casing inner diameters of less than 2 inches.

The 1991 WER (EG&G, 1991a) identified 152 wells and piezometers that failed one or more of the viability or usefulness criteria. DOE never approved the 1991 report and in August 1992, requested an improved scope for the report that would expand on the usefulness criteria. In addition, DOE also requested documentation of the original purpose for each well and an evaluation of whether that purpose had been met or whether a new purpose had been assigned. These additional tasks have been addressed as part of this report.

Further review of abandonment criteria has determined that some of the criteria may not be appropriate, as they recommend elimination of wells that may provide useful information. Instead, wells not meeting these criteria should be maintained for other possible uses. For example, small diameter wells could be used to obtain water levels although they cannot be sampled effectively, and dry wells could be used for vadose-zone investigations or other monitoring techniques.

The first WARP program (1992 WARP), initiated in December of 1991 and completed in October of 1992, implemented some of the recommendations of the 1991 WER, focusing primarily on viability criteria and on RFP wells completed prior to 1986. The 1992 WARP program eliminated 57 groundwater monitoring wells and installed 7 replacement wells. Table 1-1 lists the wells eliminated. Forty-nine wells were abandoned, eight wells were destroyed during construction of the OU1 groundwater intercept system, and one well was covered by a building.

In September 1992, DOE requested an acceleration of the well evaluation process to show an immediate cutback and subsequent cost savings to the groundwater monitoring program. A new, three-phased approach was initiated to accommodate the accelerated schedule. Phase I focused primarily on viability criteria to evaluate all wells at RFP (including wells installed after 1990) and identify wells that might be abandoned. Phase II focused primarily on useability criteria to identify additional wells that might be abandoned. Phase III of the well evaluation program is the expanded evaluation included in this well evaluation report, which provides an assessment of the current groundwater monitoring program and an evaluation of operations proposed in the *Groundwater Protection and Monitoring Program Plan* (GPMPP) (EG&G, 1991b; 1992a).

The second WARP program (1993 WARP) focused primarily on useability and viability criteria. Thirty-five wells were abandoned under the 1993 WARP. Fifteen of these wells were recommended for abandonment in the 1991 WER; however, because they were located on flood plains and their abandonment required evaluation under provisions of the National Environmental Policy Act (NEPA), these wells were abandoned during the 1993 WARP, not during the 1992 WARP. Wells abandoned under the 1993 WARP program are listed in Table 1-1. Eight replacement wells were also installed under the 1993 WARP program.

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/ Wells Abandoned Under the 1992 and 1993 WARP

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
WS01	X	X			
WS02	X	X			
WS03	X	X			
0160	X	X			
0260	X	X			
0360	X	X			
0460	X	X			
0560	X	X			
0660	X	X			
0166	X	X			
0266	X	X			
0366	X	X			
0168	X	X			
0268	X	X			
0368	X	X			
0468	X	X			
0171	X	X			
0271	X	X			
0371	X		X		X
0471	X		X		X
0571	X	X			

31

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/
Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
0671	X	X			
0174	X	X			
0374	X	X			
0474	X	X			
0574	X	X			
0674	X	X			
0774	X	X			
0874	X	X			
0974	X	X			
1074	X	X			
1374	X		X		X
1474	X		X		X
1574	X		X		X
1674	X		X		X
1774	X		X		X
1874	X		X		X
2174	X	X			
2274	X	X			
0181	X		X		X
0281	X		X		X
0381	X		X		X

32

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/
Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
0481	X	X			
0581	X	X			
0681	X	X			
0781	X	X			
0881	X	X			
0981	X	X			
1081	X	X			
0182	X	X			
0282	X	X			
0382	X	X			
0482	X	X			
0582	X	X			
0682	X	X			
0782	X	X			
0186	X		X		
0286	X	X			
0486	X		X		X
0686			X		
1186	X		X		X
1286	X				X
1886			X		

33

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/
Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
1986				X	
2086			X		X
2186				X	
2886			X		X
3186			X		
4186				X	
4486				X	
4586			X		X
5486				X	
5586			X		
5886			X		
5986		FD	X		
5986R		FD	X		
6186				X	
6986		FD	X		
0287		FD	X		
0387		FD	X		
0687		FD	X		
0887		FD	X		
1787			X		X
2087				X	

~~33~~ 34

Table 1-1
**Wells Recommended for Abandonment or Elimination from Sampling Program/
Wells Abandoned Under the 1992 and 1993 WARP
(continued)**

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
2687			X		
2787			X		
3287				X	
3587			X		
3787			X		X
4387				X	
4487			X		
4787			X		
4987			X		
5087			X		
5387				X	
5987			X		X
6287				X	
6387			X		X
6787			X		X
B102289			X		
B102389			X		
P115189		**			
B200589			X		
B200689			X		
B200789			X		

35

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/ Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
B200889			X		
B201089			X		
B201189			X		
B201289			X		
B201489			X		X
B201589			X		
B201889*					X
B202489			X		
B202589			X		
B203189					
B203289			X		
B203489			X		
B203589			X		
B203689			X		X
B203789			X		
B203889			X		
B203989			X		
B204089			X		
B204189			X		
B204689			X		X
B205589			X		

~~35~~
36

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/ Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
B206189			X		X
B206389					X
B207189			X		X
B207289					
P207489			X		X
B208389			X		
B208489			X		
B208589				X	
P209189				X	
P209989			X		X
P210289			X		X
B210389				X	
P213889			X		
P213989			X		
P218089				X	
B218789				X	
B220189			X		
B220489		X			
B301889*			X		
B302089			X		
B302789			X		

~~37~~
37

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/ Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
B302889			X		
B302989			X		
B303089			X		
B303189			X		
B304289			X		X
B304789			X		
B304889			X		
B304989			X		
B305389			X		
P317989				X	
B320589		FD			
B400189			X		
B400289			X		
B400389			X		
B400489			X		
B401989			X		
B402189			X		
B402689			X		
B405189			X		
B405289			X		
B405489			X		

Table 1-1
Wells Recommended for Abandonment or Elimination from Sampling Program/ Wells Abandoned Under the 1992 and 1993 WARP
(continued)

Well Number	1991 Well Evaluation Report Recommendations	Wells Abandoned in 1992 WARP	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Wells Abandoned in 1993 WARP
B405689			X		
B405789			X		
B405889			X		
B405989			X		
P418289				X	
00490					X
20091		X			
39991			X		X
43492			X		
TOTAL	61	57	103	18	35

FD - Destroyed during the construction of the OU1 French drain

* - Well B201889 also known as B301889

** - Building placed over well

~~38~~ 39

At present, most wells at RFP with incomplete documentation, physical damage, or improper construction have been replaced or abandoned. During the literature search required to document the original purpose for wells at RFP, additional older wells were discovered that had not been previously known to exist. These wells are presently undergoing evaluation for possible inclusion in the 1994 WARP program.

1.5 Evaluation of the Current Groundwater Monitoring Program

As of third quarter 1993, more than 400 active groundwater monitoring wells at RFP were sampled. These included wells of all classifications. Each well in the groundwater monitoring network was evaluated to determine if it was needed to meet the goals listed above.

As stated earlier, the 1993 well evaluation program consisted of three phases. Phase I involved a re-evaluation of the viability of wells in the monitoring network. As a result of the Phase I evaluation, 103 wells were recommended for elimination from the groundwater monitoring program (Table 1-1). Table 1-2 lists wells identified during Phase I and specifies the reason for proposed elimination. The 51 wells installed for use in the background geochemical evaluation program were included in this recommendation. The elimination of background wells was recommended because the background geochemical evaluation program had fulfilled its original purpose, and discontinuation of the groundwater portion of the project was proposed.

Phase II involved an evaluation of the useability of wells in the monitoring network. As a result of the Phase II evaluation, 18 additional wells were recommended for elimination from the groundwater monitoring program (Table 1-1). Table 1-2 lists wells identified during Phase II and specifies the reasons for recommending elimination.

These Phase I and Phase II cutbacks were presented to DOE, the State of Colorado Department of Health (CDH), and the U.S. Environmental Protection Agency (EPA) in December 1992 and January 1993. All proposed cutbacks were approved by CDH with the exception of the elimination of Well 0186 from the groundwater monitoring program. CDH objects to the elimination of this well because it is a boundary well.

Phase III involves an evaluation of all wells in the groundwater monitoring program using the following criteria: historical and current purpose, regulatory requirements,

Table 1-2
Wells Recommended for Elimination In Phase I and Phase II of the Well Evaluation Program

Well Number	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Reason for Recommending Elimination
0371	X		Missing or incomplete construction information
0471	X		Missing or incomplete construction information
1374	X		Missing or incomplete construction information
1474	X		Missing or incomplete construction information
1574	X		Missing or incomplete construction information
1674	X		Missing or incomplete construction information
1774	X		Missing or incomplete construction information
1874	X		Missing or incomplete construction information
0181	X		Missing or incomplete construction information
0281	X		Missing or incomplete construction information
0381	X		Missing or incomplete construction information
0186	X		Well damaged
0486	X		Well damaged
0686	X		Insufficient Water
1186	X		Well damaged
1886	X		Insufficient Water
1986		X	Well has met its intended purpose
2086	X		Well damaged
2186		X	Well has met its intended purpose
2886	X		Well damaged
3186	X		Insufficient Water
4186		X	Redundant Well
4486		X	Well has met its intended purpose
4586	X		Well damaged
5486		X	Well has met its intended purpose
5586	X		Background Characterization Well
5886	X		Insufficient Water
5986	X		Well damaged
5986R	X		Well damaged
6186		X	Well has met its intended purpose
6986	X		Well damaged

1-2.XLS 4/28/94 1:54 PM

Table 1-2
Wells Recommended for Elimination In Phase I and Phase II of the Well Evaluation Program

Well Number	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Reason for Recommending Elimination
0287	X		Well damaged
0387BR	X		Well damaged
0687	X		Well damaged
0887	X		Well damaged
1787	X		Well damaged
2087		X	High pH
2687	X		Insufficient Water
2787	X		Insufficient Water
3287		X	Redundant Well
3587	X		Insufficient Water
3787	X		Well damaged
4387		X	High pH / Redundant Well
4487	X		Insufficient Water
4787	X		Insufficient Water
4987	X		Insufficient Water
5087	X		Insufficient Water
5387		X	Redundant Well
5987	X		Well damaged
6287		X	Redundant Well
6387	X		Well damaged
6787	X		Well damaged
B102289	X		Background Characterization Well
B102389	X		Background Characterization Well
B200589	X		Background Characterization Well
B200689	X		Background Characterization Well
B200789	X		Background Characterization Well
B200889	X		Background Characterization Well
B201089	X		Background Characterization Well
B201189	X		Background Characterization Well
B201289	X		Background Characterization Well
B201489	X		Insufficient Water / Background Characterization Well

1-2.XLS 4/28/94 1:54 PM

~~42~~ 42

Table 1-2
Wells Recommended for Elimination In Phase I and Phase II of the Well Evaluation Program

Well Number	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Reason for Recommending Elimination
B201589	X		Background Characterization Well
B202489	X		Background Characterization Well
B202589	X		Background Characterization Well
B203289	X		Background Characterization Well
B203489	X		Background Characterization Well
B203589	X		Background Characterization Well
B203689	X		Well damaged
B203789	X		Background Characterization Well
B203889	X		Background Characterization Well
B203989	X		Background Characterization Well
B204089	X		Background Characterization Well
B204189	X		Background Characterization Well
B204689	X		Well damaged / Background Characterization Well
B205589	X		Background Characterization Well
B206189	X		Missing or incomplete construction information
B207189	X		Well damaged
P207489	X		Missing or incomplete construction information
B208389	X		Insufficient Water
B208489	X		Insufficient Water
B208589		X	Redundant Well
P209189		X	Redundant Well
P209989	X		Insufficient Water
P210289	X		Well damaged
B210389		X	Redundant Well
P213889	X		Insufficient Water
P213989	X		Insufficient Water
P218089		X	Well has met its intended purpose
B218789		X	Well has met its intended purpose
B220189	X		Insufficient Water
B301889*	X		Insufficient Water / Background Characterization Well
B302089	X		Background Characterization Well

Table 1-2
Wells Recommended for Elimination In Phase I and Phase II of the Well Evaluation Program

Well Number	1993 Well Evaluation Program - Phase I Recommendations	1993 Well Evaluation Program - Phase II Recommendations	Reason for Recommending Elimination
B302789	X		Background Characterization Well
B302889	X		Background Characterization Well
B302989	X		Background Characterization Well
B303089	X		Background Characterization Well
B303189	X		Background Characterization Well
B304289	X		Insufficient Water / Background Characterization Well
B304789	X		Background Characterization Well
B304889	X		Background Characterization Well
B304989	X		Background Characterization Well
B305389	X		Background Characterization Well
P317989		X	Well has met its intended purpose
B400189	X		Background Characterization Well
B400289	X		Background Characterization Well
B400389	X		Background Characterization Well
B400489	X		Background Characterization Well
B401989	X		Background Characterization Well
B402189	X		Background Characterization Well
B402689	X		Background Characterization Well
B405189	X		Background Characterization Well
B405289	X		Background Characterization Well
B405489	X		Background Characterization Well
B405689	X		Background Characterization Well
B405789	X		Background Characterization Well
B405889	X		Background Characterization Well
B405989	X		Background Characterization Well
P418289		X	Well has met its intended purpose
39991	X		Well damaged
43492	X		Background Characterization Well

* Formerly also known as B301889

1-2.XLS 4/28/94 1:54 PM

44

program design, usefulness, analysis of geochemical data, and viability. The findings and recommendations of the Phase III well evaluation are summarized in this report.

1.6 Report Organization

Section 1.0 presents background information regarding the location and operational history of RFP and summarizes the existing groundwater monitoring program. Section 2.0 summarizes the general physical and chemical conditions at RFP, including geology, hydrogeology, and groundwater geochemistry. Section 3.0 summarizes regulatory requirements (i.e., regulatory driven wells and sampling schedules and analyte lists) and discusses possible future changes to these requirements. Section 4.0 presents recommendations for the design of a monitoring program based on technical objectives and regulatory requirements. Well number and locations, sampling frequencies, and analytical suites are proposed. Also presented are recommendations for a point-of-compliance for RFP, additional site characterization activities, and methods for improving data useability. Section 5.0 presents references.

Supporting data are included in the appendices to the report. Appendix A presents hydrographs discussed in Section 2.2. Appendix B lists wells at RFP and their location, status, and purpose. Appendix C lists wells at RFP and their elevation details (top of bedrock and bottom of well screen). Appendix D provides trend plots discussed in Section 2.3. Appendix E provides well data sheets and summary statistics for each well in the groundwater monitoring network.

2. SITE CHARACTERIZATION

A conceptual understanding of containment hydrogeology (the nature, distribution, and transport of contamination in the saturated subsurface) is a technical foundation for the design of an effective groundwater monitoring program. To contribute to this understanding, sitewide assessments were conducted of (1) the geologic media through which the groundwater flows, (2) the hydrologic conditions and resulting patterns of groundwater flow, and (3) the chemical distribution of contaminants and migration pathways within these media. The methods used to conduct these assessments and the resulting interpretations are discussed below. The understanding gained from these sitewide assessments provides a foundation for technical recommendations to the sitewide groundwater monitoring program.

2.1 Geology

RFP is situated on the Colorado High Plains and is located between two and six miles east of the Front Range mountain front. East of the Precambrian-age mountain core, the gently eastward-dipping Cretaceous-age bedrock was subjected to erosion. This produced the broad, flat erosional surface (a peneplain) interpreted from geologic mapping and lithologic logging investigations. This surface is the higher, flat top of bedrock portrayed on geologic cross sections. Following the end of the Pleistocene epoch, heterogeneous sediments (composing the Rocky Flats Alluvium) were deposited on this bedrock peneplain.

Beginning in the Holocene, headward erosion by westerly progressing drainages began to incise both the Rocky Flats Alluvium and the underlying bedrock peneplain. Approximately half of the surface area covered by the RFP has been incised, as shown on topographic maps and geologic cross sections. In some areas, these Holocene and younger erosional surfaces have subsequently been covered by stream sediments or colluvium. The bedrock surface has, therefore, been modified by two erosional events: the pre-Pleistocene peneplanation, and the Holocene and younger headward erosion.

The Rocky Flats Alluvium and associated unconsolidated surficial materials overly this modified bedrock surface. These geologic materials have different hydraulic conductivities and different sedimentological and erosional configurations which influence the movement of surface water and groundwater. Hydrogeologic

46

46

conceptualization of the aquifers contained by these geologic media is necessary to understand how contaminants may be adsorbed, transported or dispersed at the RFP.

Both groundwater flow and contaminant transport are influenced by chemical and physical characteristics of the geologic media. These characteristics include lithology (physical characteristics), mineralogy (chemical composition), and stratigraphy (spatial dimensions and structural orientation of units). This assessment focuses on the lithologic and stratigraphic characteristics that influence groundwater flow. Influences of mineralogy and grain size on chemical interactions such as sorption capacity, reaction kinetics, and solute transport are not evaluated in this report.

The primary sources of data used in this geologic assessment are lithologic borehole logs for wells drilled from 1987 to 1993. Data from geologic characterization reports (EG&G, 1991c; 1992b), and OU reports (U.S. DOE, 1991a; 1991b; 1991c; 1992b; 1992c; 1992d) were also considered.

2.1.1 Lithology

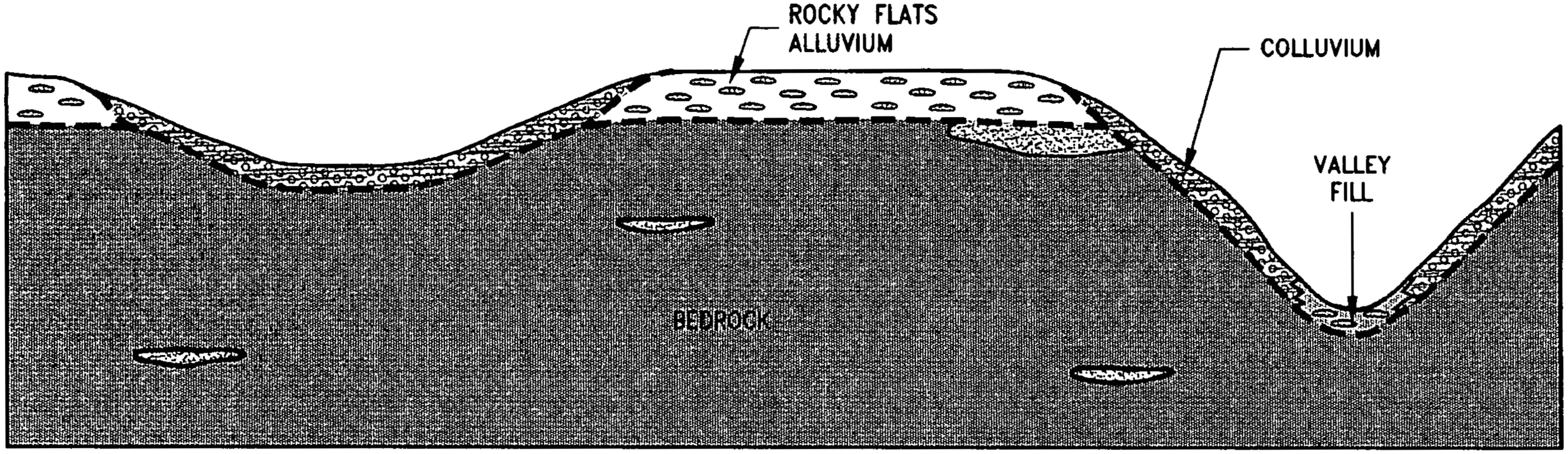
The geologic media at RFP can be grouped into two general categories: unconsolidated surficial deposits and underlying consolidated bedrock. Figure 2-1 is a generalized geologic cross section that illustrates the surficial and bedrock geologic materials within each group.

2.1.1.1 Unconsolidated Surficial Deposits

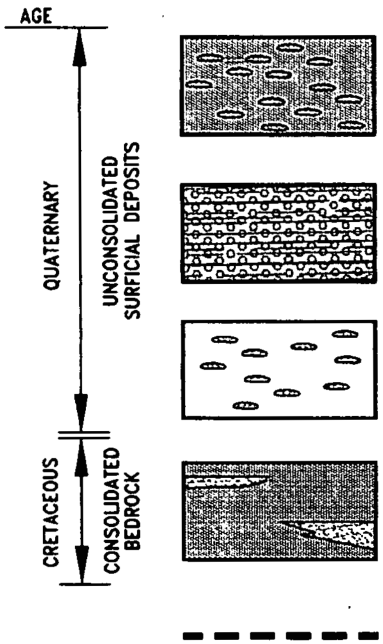
A layer of unconsolidated Quaternary deposits is present at the surface of RFP. These unconsolidated deposits include Holocene colluvium and valley-fill alluvium and Pleistocene alluvium. Holocene slump or landslide material is also present locally.

Holocene unconsolidated deposits (colluvium, landslide, and valley-fill alluvium) were formed by geomorphic processes presently operating at RFP. Colluvial deposits were derived from geologic material exposed on steep slopes and topographic highs and were formed by slope wash and downward creep. Colluvium typically consists of loose material and is present on valley slopes in the middle portion of RFP. Thicknesses range from 0 to 20 feet, with the thickest colluvial sequences occurring at the base of these valley slopes. Colluvial deposits are composed of clay, clayey gravels, and gravelly clays with lesser amounts of sand and silt. Landslides were formed by a variety of mass movement processes involving the downslope transport of

GENERALIZED GEOLOGIC CROSS SECTION



EXPLANATION



LITHOLOGIC DESCRIPTION

VALLEY FILL: clay, silt, and pebbly sand with silty and cobbly gravel lenses.

COLLUVIUM: clayey coarse gravel and coarse sand, slope debris derived from Rocky Flats Alluvium and outcropping bedrock.

ROCKY FLATS ALLUVIUM: poorly sorted, angular to subrounded cobbles, coarse gravels, coarse sands, and gravelly clays, lenses of clay, silt, and sand.

BEDROCK: claystone and siltstone, varying amount of clay, silt, and sand, weathered intervals, sandstone lenses.

Erosional Unconformity

EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

GENERALIZED GEOLOGIC CROSS SECTION AND LITHOLOGIC DESCRIPTION

Well Evaluation Report

Date: April 1994	Figure 2-1

~~#~~ 48

soil and rock material *en masse*. Slump or landslide deposits were derived from unconsolidated surficial deposits and bedrock and are most common on valley slopes along the Rock and Walnut Creek drainages of RFP. Valley-fill deposits were fluvial deposits derived from upstream materials and consist of clay, silt, and sand with gravel lenses. As the term implies, valley-fill deposits were developed along the lowland areas in and adjacent to stream beds and are most common in the eastern portion of RFP. Thicknesses range from 0 to 25 feet (EG&G, 1991c).

Pleistocene deposits consist primarily of the Rocky Flats Alluvium, which is the most prominent unconsolidated surficial deposit at RFP. The Rocky Flats Alluvium ranges from 0 to 100 feet in thickness and forms a broad sheet of unconsolidated material that extends across most of the western portion of RFP (EG&G, 1992b). It is composed of a series of coalescing alluvial fans and is thickest west of RFP near the mouth of Coal Creek Canyon and thinnest east of RFP near the deposition limit of the fans.

Lithologic borehole logs indicate that the alluvial material commonly consists of unconsolidated, well-graded, coarse gravels, coarse sands, and gravelly clays with discontinuous lenses of clay, silt, and sand (Appendix E). The borehole logs reveal the relatively high degree of heterogeneity within the Rocky Flats Alluvium.

2.1.1.2 Consolidated Bedrock

The unconsolidated surficial deposits unconformably overlie bedrock of the Upper Cretaceous Arapahoe and Laramie Formations. The unconformity is an erosion or pediment surface.

The Arapahoe Formation, as defined in the *Phase I Geologic Characterization Report* (EG&G, 1991c), is approximately 150 feet thick beneath the middle portion of RFP. It contains at least five separate, discontinuous, but mappable sandstone units, designated as the Number (No.) 1 through No. 5 sandstones. More recent work, based on field mapping (EG&G, 1992b), indicates that the Arapahoe Formation is less than 50 feet thick in the middle portion of RFP. The basal Arapahoe sandstone, as defined in the *Phase II Geologic Characterization - Surface Geologic Mapping Report* (EG&G, 1992b), is equivalent to the uppermost, or No. 1 sandstone of the *Phase I Geologic Characterization Report*. Attempts to resolve this controversy are in progress; however, in either case, the No. 1 sandstone is of concern as a potential contamination pathway.

The No. 1 Sandstone is fine- to medium-grained, locally conglomeratic, subangular to subrounded, moderately to poorly sorted sandstone. It has been interpreted as part of a fluvial sequence, deposited as meandering channel, point bar, overbank, and crevasse splay deposits (EG&G, 1991e). Individual channel sandstones can become stacked by vertical aggradation, but most tend to be separated from each other by substantial amounts of claystone. The channel sandstones are characterized by lenticular, shoestring geometries. These factors tend to decrease hydraulic conductivity in the vertical dimension and laterally across the dip direction. However, the No. 1 sandstone is in hydraulic connection with the overlying unconsolidated surficial deposits in some areas at RFP.

The other four sandstone units (designated as the No. 2, No. 3, No. 4, and No. 5 sandstones) occur in the bedrock beneath the No. 1 sandstone, and are in the Arapahoe Formation as defined in the *Phase I Geologic Characterization Report* (EG&G, 1991c), or in the Laramie Formation, as defined in the *Surface Geologic Mapping Report* (EG&G, 1992b). Deep boreholes, drilled during the 1991-1992 sitewide program for the purpose of characterizing these sandstones, encountered more siltstone than sandstone (see borehole logs 40191 to 44792 in Appendix E). The No. 2 through No. 5 sandstones are thinner and more silt- and clay-rich than the No. 1 sandstone, display less lateral continuity, and do not exhibit depositional characteristics typically associated with channel sandstone (EG&G, 1991c; 1992b). Because they are encased in claystones and are not in hydraulic connection with No. 1 sandstone or the unconsolidated surficial deposits, the No. 2 through No. 5 sandstones are probably not significant from a sitewide monitoring perspective.

Because this report focuses on the physical characteristics that influence groundwater flow, the Arapahoe and Laramie Formations are grouped together and are hereafter referred to collectively as shallow bedrock.

Lithologic borehole logs indicate that shallow bedrock material typically consists of claystones and siltstone with lesser amounts of sandstone (Appendix E). In general, the bedrock exhibits a higher percentage of fine-grained material and is better cemented than the overlying unconsolidated surficial deposits, which decreases permeability and reduces the amount of groundwater flow. Also evident from the borehole logs is a weathered zone in the upper portion of bedrock. The weathered zone is commonly less than 15 feet thick, but may extend to 60 feet below the top of the bedrock. The thickness of the weathered zone is dependent of factors such as abundance of fractures, presence of root zones, elevation relative to the water table, and proximity to valley bottoms. Fracturing and weathering increase permeability of bedrock material.

2.1.2 *Stratigraphy/Structure*

Stratigraphy of the geologic media at RFP is defined by the spatial dimensions and relative positioning of the lithologic units discussed above and is also influenced by structural features such as bedding attitude, faults, and fractures. However, this assessment uses existing data, primarily lithologic borehole logs, to develop interpretations. These data rarely include information on faults and fractures; therefore, structural features are addressed only cursorily.

One of the most significant morphological features at RFP, relative to groundwater flow, is topography. The regional topography at RFP slopes toward the east. Within this regional slope, however, are significant variations related to localized relief. In both the western and eastern portions of RFP, significant expanses of relatively flat topography exist. In contrast, in the middle portion of the facility, the regional slope is dissected by several eastward flowing stream drainages. This valley incision contributes to increased relief in the form of east-west trending ridges and east-draining valleys. The paleotopographic surface of the underlying bedrock has also been incised by these streams (Plate 2-1).

Shallow bedrock dips eastward at less than 2 degrees under the middle portion of the plant (EG&G, 1992b). The erosion surface on top of the bedrock dips eastward at more than 2 degrees. As a result, shallow bedrock units pinch out to the east against the erosion surface rather than plunging down into the subsurface. In addition, shallow bedrock units subcrop and outcrop along present stream valleys as a result of the valley incision.

To investigate geologic relationships pertinent to groundwater flow, 13 hydrogeologic cross sections were constructed across the site (Figure 2-2). Maps showing the interpreted extent of the No. 1 sandstone, maps of seeps, a map of the bedrock paleotopographic surface, potentiometric data and maps, lithologic borehole logs, and well construction information were used in the construction of the cross sections. The unconsolidated surficial deposits and shallow bedrock have been grouped into three general lithostratigraphic units on the cross sections as follows:

51

51

- Relatively permeable unconsolidated surficial deposits, including colluvium, valley-fill alluvium, landslide deposits, and Rocky Flats Alluvium

- Relatively permeable bedrock, including sandstone

- Relatively impermeable bedrock, including claystone and siltstone

Nine of the 13 cross sections were constructed along north-south trends, or roughly normal to the direction of the regional topographic slope. From west to east, these cross section designations and appropriate plate numbers include the following:

- Cross Sections A-A', B-B', C-C' (Plate 2-2)

- Cross Sections D-D', E-E', F-F' (Plate 2-3)

- Cross Sections G-G', H-H' (Plate 2-4)

- Cross Sections I-I' (Plate 2-5)

The other four cross sections were constructed along east-west trends, parallel to the direction of the regional topographic slope. From north to south, these cross section designations and appropriate plate numbers include the following:

- Cross Section L-L"' (Plate 2-7)

- Cross Section M-M" (Plate 2-8)

Beginning with Cross Section L-L"' (Plate 2-7), which trends from west to east and is the longest east-west cross section prepared, several characteristics of the geologic media pertinent to groundwater flow are evident. There is a relatively thick sequence of unconsolidated surficial deposits (Rocky Flats Alluvium) present in the western portion (Segment L-L') of this cross section. On Segment L"-L", the unconsolidated surficial deposits have thinned substantially in the middle to eastern portion of RFP. On steeper slopes in this area, the unconsolidated surficial deposits likely consist primarily of colluvium. The ground surface and the bedrock paleotopographic surface have very similar shapes throughout this cross section. In the area of steeper topography along the slope above Walnut Creek, the No. 1 sandstone, identified in the borehole log from Well 1487, subcrops beneath the colluvium.

53

53

The thickness and extent of the sandstone units shown on the cross sections were drawn using interpretations presented in the *Phase I Geologic Characterization Report* (EG&G, 1991c), which are based on net thicknesses of fluvial deposits rather than actual thicknesses of sandstone units from borehole logs (Well P416989 and P416289 on Segment L-L' and Well 1487 on Segment L'-L", for example). In the vicinity of the Wells P416989 and P416289, the sandstone unit, denoted as the No. 1 sandstone, is in direct contact with the overlying unconsolidated surficial deposits. Other shallow sandstone lenses beneath the No. 1 sandstone are also present (at Well 4886, for example). Based on the borehole logs, sandstone appears to constitute a relatively limited volume of the bedrock.

Cross Sections J-J' and K-K" (Plate 2-6) also trend from west to east and again illustrate the east-sloping regional topographic surface. The thicker unconsolidated surficial deposits present in the western portion of RFP thin toward the east and there is a close relationship between the bedrock paleotopographic surface and the ground surface. On Cross Section J-J', the vertical extent of landfill disturbance is shown west of the Landfill Pond. Several sandstone sequences exist within the bedrock on J-J' and K-K'. The more extensive occurrences are based on net thickness of fluvial deposits (EG&G, 1991c). Because the ground surface and paleotopographic surface on these cross sections are of relatively low relief, subcrops of these sandstones are generally limited. However, in the vicinity of Well P209389 and Boring SP02-87 (Segment K-K'), the No. 1 sandstone occurs in direct contact with the overlying unconsolidated surficial deposits.

On Segment K'-K", a relatively thick sequence of unconsolidated surficial deposits is shown in the eastern portion of RFP. These deposits are located on a ridge top and illustrate that unconsolidated surficial deposits are thickest on top of the pediment surface where they have not been eroded. Cross Section M-M" (Plate 2-8), which further illustrates this situation, begins in the western portion of RFP and follows the Woman Creek drainage. Near its midpoint, the cross section bends to the northeast and trends along a ridge that extends east-northeastward from the industrial area. Along Woman Creek, the unconsolidated surficial deposits are relatively thin; on top of this ridge, the unconsolidated surficial deposits are relatively thick.

The remaining cross sections trend north-south, approximately normal to the regional topographic slope and provide a view of the geology from a different perspective. In comparing Cross Sections A-A', B-B', and C-C' (Plate 2-2), which are located in the

54

54

western portion of RFP, the eastward thinning sequences of unconsolidated surficial deposits are again evident. Also evident is a slight northerly dip to the bedrock paleotopographic surface. The relatively low relief along these north-south trends is consistent with the relatively flat regional slope of the alluvial fan surface in this area. Several sandstone units have been mapped in the bedrock in this area, but subcrops are limited as a result of the low erosional relief on the bedrock surface.

Cross Sections D-D', E-E', and F-F' (Plate 2-3) show the geologic structure in the middle portion of RFP. Local relief becomes greater in this region as a result of stream incision of the unconsolidated surficial deposits and the underlying bedrock. Subcrops and crops out of the No. 1 sandstone and other sandstones also become more prevalent on these cross sections. In particular, an outcrop of the No. 1 sandstone is shown along the bedrock (and topographic) ridge that lies between the South Walnut and Woman Creek drainages.

Cross Sections G-G', H-H', and I-I' (Plates 2-4 and 2-5) illustrate a change from the more incised fan (and the associated high relief exhibited in Cross Section G-G') to the flatter topography of the eastern portion of RFP (shown in Cross Sections H-H' and I-I'). As in all of the cross sections, the general shape of the ground surface again closely matches that of the bedrock paleotopographic surface. The sequence of unconsolidated surficial deposits is relatively thin on these cross sections, except for the southern portion of G-G' and the middle portion of H-H', which display the same upland ridge of unconsolidated surficial deposits exhibited on Cross Section M-M'.

To facilitate the three-dimensional understanding of the geology at RFP, several of these two-dimensional cross sections have been assembled into schematic fence diagrams. Plate 2-9 illustrates the topography and underlying geology beneath the eastern industrial area from a perspective looking toward the southwest. Again, the general eastward slope of the ground surface and eastward thinning of unconsolidated surficial deposits are clearly evident. East-west trending Cross Section K-K' portrays the locally steeper eastward topographic slope between the intersections with Cross Sections E-E' and F-F'. Increased relief between stream drainages is also illustrated on Cross Sections E-E' and F-F' in this area. Relatively thicker sequences of unconsolidated surficial deposits are also evident on some ridge tops. The distribution of the No. 1 sandstone illustrates the meandering nature of the former stream channel. Plate 2-10 schematically illustrates this information from a perspective looking toward the northwest.

55

55

2.1.3 Geologic Characteristics and Their General Hydrologic Influence

Several characteristics of the geology at RFP influence groundwater flow patterns. These characteristics include the following:

- Topography - The regional ground surface slopes to the east. An area of relatively deeper slope incision occurs in the middle to mid-eastern portion of RFP. Increases topographic relief in the form of east-draining valleys and accompanying, east-west trending ridges occur in the area of deeper incision. Farther east, the relief diminishes again.

  Surface water recharge originates upslope, near the base of the Front Range west of RFP. The recharge drainage basin is limited (less than four square miles) and several streams originate on RFP. Along the moderate-relief northern and eastern RFP boundaries, surface waters are conveyed by the three principle streams flowing eastward.

- Paleotopography - The bedrock paleotopographic surface closely matches the ground surface.

  In the western area of RFP the bedrock paleotopography, like the ground surface, is planar and eastward sloping resulting in approximately parallel, eastward distribution of recharge. In the middle to mid-eastern areas, paleotopographic relief is greatest. Accordingly, surficial recharge and shallow groundwater flow is toward valleys and paleotopographic lows converging toward and beneath present-day drainages.

- Lithology and Permeability of Unconsolidated Surficial Deposits - The bedrock paleotopographic surface is separated from the ground surface by a layer of unconsolidated surficial deposits. This layer thins to the east and also on steeper valley slopes. These unconsolidated surficial deposits include a very heterogeneous mixture of sands, silts, clays, and cobbles, which collectively exhibit much higher permeability than the underlying bedrock (see Section 2.2).

  Because these materials have highest permeability and are generally unsaturated in upper zones, recharge water and surficial solutes move vertically downward until they reach the piezometric surface. Thereafter, groundwater flow is downgradient in horizontal directions.

56

- Lithology and Permeability of Bedrock - The bedrock is a consolidated deposit consisting primarily of claystone, siltstone, and lesser amounts of sandstone. As a result of the higher percentage of clay and silt present and the effects of lithification, the bedrock is much less permeable than the overlying unconsolidated surficial deposits (see Section 2.2).

  Paleoweathering of the pediment has enhanced the bedrock permeability to variable depths. This weathering caused the uppermost bedrock to be intermediate in permeability between that of the overlying, unconsolidated surficial deposits and the underlying, unweathered bedrock. Downward groundwater flow from overlying unconsolidated surficial deposits is progressively reduced because the majority of the bedrock claystone and siltstone behaves as a confining layer. A large proportion of this groundwater flow continues laterally at the bedrock surface issuing as seeps on valley slopes or converging toward fluvial drainages and recharging eastward flowing streams.

- Distribution of No. 1 Sandstone - The No. 1 sandstone is in direct contact with overlying unconsolidated surficial deposits at some locations at RFP.

  The permeability of the No. 1 sandstone is intermediate to that of the overlying unconsolidated surficial deposits and the flanking finer clastics, chiefly claystone. Because this sandstone is volumetrically limited, relative to the claystone, its influence is of local concern only when in close contact to the unconsolidated surficial deposits. The sandstone geometry is quite likely sinuous but the hydraulic gradients are not well defined. Where the hydraulic head in sandstone is less than flanking aquifers, influent groundwaters may have greater ease of entry. Hydraulic gradients within the sandstone would be influential to groundwater flow. Flow directions would be dependent upon hydrologic properties of the sandstone.

2.2 Hydrogeology

Hydrogeologic conditions at RFP were examined to describe the groundwater flow regime and identify potential contaminant migration pathways. An understanding of hydrogeologic conditions and contaminant hydrology at RFP provides a technical basis for designing a groundwater monitoring system capable of detecting groundwater contamination and its subsequent migration.

A sitewide conceptual model of groundwater flow at RFP was developed using the following types of information: groundwater potentiometric surfaces, vertical hydraulic gradients, hydraulic conductivities of aquifer materials, groundwater/surface water interactions, and dam construction and investigation details.

Basic to the discussion of the site hydrogeology are the definitions of an aquifer, a lithostratigraphic unit, and a hydrostratigraphic unit. For the purposes of this report, the following definitions have bee adopted. The regulatory definition of an aquifer is a geologic unit capable of yielding a significant amount of water to wells or springs (40 CFR 260.10). At RFP, this has been interpreted as enough water to sample and analyze. A geologic formation is a body of rock identified by lithic characteristics and stratigraphic position (Bates and Jackson, 1987). A formation may contain more than one lithostratigraphic unit, which is defined by its lithologic characteristics. A hydrostratigraphic unit is composed of geologic materials with similar hydrologic properties (Fetter, 1988). A hydrostratigraphic unit may be composed of one or more lithostratigraphic units or geologic formations and it may fit the definition of an aquifer or a confining layer.

Describing geologic materials in terms of hydrostratigraphic units is useful in discussions of hydrogeology because the relative hydrologic properties of materials are considered rather than the lithologic properties. This contrast of hydrologic properties determines the nature of groundwater flow.

At RFP, the upper hydrostratigraphic unit consists of several distinct lithostratigraphic units: Rocky Flats Alluvium, colluvium, valley-fill alluvium, landslide deposits, weathered Arapahoe and Laramie Formation bedrock, and all sandstone units within the Arapahoe and Laramie Formations that are in hydraulic connection with overlying unconsolidated surficial deposits or the ground surface. The lower hydrostratigraphic unit is composed of unweathered bedrock of the Arapahoe and Laramie Formations.

Although this report strives to use the concept of the hydrostratigraphic unit, only preliminary, unpublished information exists to construct quantitative models based on hydrostratigraphic units rather than lithostratigraphic units. Groundwater potentiometric-surface maps and chemical concentration contour maps were compiled for the lithostratigraphic units defined in Section 2.1.2 instead of the hydrostratigraphic units defined above. The concept of hydrostratigraphic units is incorporated into a conceptual model for groundwater flow.

2.2.1 Groundwater Potentiometric Surfaces

Groundwater potentiometric-surface maps for RFP were constructed for both spring and fall 1992 for unconsolidated surficial deposits (Plates 2-11 and 2-12). Quarterly depth to water measurements are taken during the first 10 days of the quarter. For the second and fourth quarter 1992, the majority of the measurements (taken at 437 and 412 wells, respectively) were completed in the first three days of the quarter. Therefore, second quarter potentiometric-surface maps were constructed using depth-to-water data measured during the first three days of April. Fourth quarter potentiometric-surface maps were constructed using depth-to-water data measured during the first three days of October. These measurements provide a "snapshot" of water levels during high- and low-flow quarters at RFP. Because depth to water was not measured in all wells during the narrow time interval of three days, some data gaps exist and the extent of saturated and unsaturated material is only approximately defined. Potentiometric maps in this report may differ from OU specific maps due to (1) a broader, sitewide perspective used in this report, and/or (2) different time intervals for collecting data. In addition, unsaturated areas depicted on the potentiometric-surface maps may not always coincide with data presented on the chemical concentration contour maps. Discrepancies occur because the time interval during which the wells are sampled far exceeds the time interval during which water levels are measured. As water levels change, wells that were dry when water levels were measured may recharge later and contain sufficient water for sampling (or vice versa).

The second quarter 1992 groundwater potentiometric-surface map for unconsolidated surficial deposits shows that water-level elevations range from approximate highs of 6,100 to 6,120 feet above mean sea level in the west to approximate lows of 5,640 to 5,620 feet in the east (Plat 2-11). In general, water levels drop slightly in the fall and greater seasonal fluctuations in water levels occur in the middle portion of the site.

In general, saturated unconsolidated deposits are fairly thick in the western portion of the site and thin to the east. Water levels in the unconsolidated surficial deposits vary throughout the year. In the middle portion of the site, the Rocky Flats Alluvium and smaller areas of colluvium become unsaturated during dry seasons. These unsaturated areas are located predominantly on the eastward-trending ridges between the various drainages of Woman Creek and Walnut Creek. Surficial deposits and shallow bedrock are also unsaturated as a result of dewatering by the groundwater intercept systems at

59

59

OU1 and OU4. Preliminary, unpublished results of field investigations at OU2 indicated that much of the unconsolidated surficial material and bedrock in local high areas are also unsaturated on the ridge between Woman Creek and South Walnut Creek (Newill, 1993; Primrose, 1993). Unsaturated areas depicted on potentiometric-surface maps in this report are generally smaller than on preliminary maps for the OU2 investigation as a result of the slightly different measurement periods and data sets used.

The hydrogeologic cross sections can be used to analyze the groundwater potentiometric surface within the unconsolidated surficial deposits (Plates 2-2 to 2-8). These cross sections were referenced earlier in the report to describe the spatial orientation of the geologic units at RFP. In this section, potentiometric information shown on the cross sections is used to describe groundwater flow at the site.

On Cross Section L-L"' (Plate 2-7), which trends from west to east, the potentiometric surface within the unconsolidated surficial deposits closely parallels the bedrock paleotopographic surface and generally slopes eastward. Groundwater in these deposits flows regionally from west to east. The saturated thickness of the unconsolidated deposits is greatest in the western portion of RFP, where these deposits are thickest, and the topographic slop is relatively flat. Moving toward the east (segment L'-L") the ground surface steepens and the saturated thickness, as well as the thickness of the unconsolidated surficial deposits, decreases. In the eastern portion of RFP (segment L"-L"') the topographic slope again decreases, and the saturated thickness of the unconsolidated surficial deposits increases. The potentiometric surface in the unconsolidated surficial deposits exists above and closely parallels the bedrock paleotopographic surface. This illustrates the strong influence that the lower permeability bedrock has on groundwater flow within the unconsolidated surficial deposits.

Cross Sections J-J' and K-K" (Plate 2-6) also trend from east to west. The potentiometric surface within the unconsolidated surficial deposits again closely parallels the bedrock paleotopographic surface, and where it reaches the ground surface (along steeper slopes in drainages, for example), seeps occur. The increased topographic relief in the vicinity of the Walnut Creek drainage is mirrored by a significant increase in the hydraulic gradient in this area. Similar patterns are evident on west-east trending Cross Section M-M" (Plate 2-8).

Cross Sections A-A' through G-G' (Plates 2-2 through 2-4) are drawn across RFP from north to south and illustrate the same patterns from a different perspective.

60

Of particular importance are the high hydraulic gradients within unconsolidated surficial deposits in the central and east-central portions of RFP, illustrated on Cross Sections D-D', E-E', F-F' (Plate 2-3). The relief in the water table again correlates with the increased relief along east-west trending ridges and east-draining valleys. Farther east, the relief diminishes again.

2.2.2 *Vertical Groundwater Flow*

The hydrogeologic cross sections indicate that gradients in unconsolidated surficial deposits are controlled by topography and relief on the bedrock paleotopographic surface. In areas of relatively high topographic relief, such as the central portions of the facility, high hydraulic gradients are present. In these areas, potentiometric surfaces slope toward stream drainages, and groundwater in unconsolidated surficial deposits discharges to streams.

Vertically distributed potentiometric data are assessed to: (1) determine the relationship of groundwater in unconsolidated surficial deposits to groundwater in deeper bedrock units; (2) determine the potential for the downward migration of contaminants where contaminant sources areas are located on ridges; and (3) evaluate the interaction of groundwater in bedrock and in unconsolidated surficial deposits along stream drainages to determine whether bedrock groundwater discharges to unconsolidated surficial deposits or to surface water in streams.

Vertical hydraulic gradients are assessed using two types of data: hydrogeologic cross sections and well cluster hydrographs. Hydrogeologic cross sections are used to compare hydraulic head in wells screened in the bedrock to those screened in unconsolidated surficial deposits. This yields information about the direction of vertical flow. Review of the cross sections indicates that potentiometric data are very limited during the April 1 to April 3, 1992, measurement period for wells screened in bedrock. All existing data indicate that potentiometric water levels in the bedrock are below those in the unconsolidated surficial deposits. This indicates downward vertical gradients at these locations. However, none of these data occur in the major drainages. In an attempt to supplement these data, an analysis of potentiometric data in cluster wells was conducted.

Evaluation of well cluster hydrographs provides information relative to two components of vertical flow: gradients and relative hydraulic connection. Gradients are obtained by comparing water elevations in wells (or piezometers) screened at different depth

61

61

intervals. At any point in time, the gradient exists in the direction from the higher hydraulic head toward the lower hydraulic head and reflects the direction of vertical flow. For example, if a well with a deeper screened interval exhibits a higher hydraulic head than a well with a shallower screened interval, the gradient and direction of vertical flow are upward. The rate of vertical flow is a function of the hydraulic conductivity and saturation of the lithologic units separating the screened intervals.

The presence of vertical hydraulic connection between hydrostratigraphic units at different depths can be qualitatively assessed by comparing the water elevation hydrographs in wells screened in these units over time. If water elevation hydrographs closely match (in hydraulic head and the frequency and magnitude of fluctuations in water-level elevations), the vertical hydraulic connection is likely to be high. If the magnitude of hydraulic head and the frequency and magnitude of fluctuations in water level elevations are significantly different, the vertical hydraulic connection is likely to be lower. The interpretations must be qualified, however, because individual hydrostratigraphic units may be affected similarly by recharge and discharge events. This may result in similar hydrographs even though vertical hydraulic connection is limited in these wells. If recharge or discharge conditions affect both screened units similarly, the fluctuations observed at monitoring wells may match, even if there is no hydraulic communication taking place at the monitoring wells.

Thirty-three well cluster locations were evaluated; only 25 locations exhibited sufficient water-level and well-completion data to construct hydrographs (Hydrographs 1 through 25 in Appendix A). All available water levels from 1986 to 1993 were used for the hydrographs. The hydrographs provided information on vertical gradients and vertical hydraulic connections between hydrostratigraphic units.

Of the 25 hydrographs, 20 display downward vertical gradients, 3 display upward vertical gradients, and 2 display no apparent gradient (identical potentiometric surfaces). Hydrographs that display downward vertical gradients (Hydrographs 1, 4, 5, 6, 7, and 11 through 25, in Appendix A) are usually in the topographically higher areas between the drainages (such as ridges), or in areas of relatively low relief (Figure 2-3). The hydrographs with equal potentiometric surfaces are located in a bedrock paleochannel in the OU2 area where hydraulic conductivity is high as a result of weathered zones and shallow sandstone units (Hydrographs 2 and 3). Hydrographs that display upward gradients (Hydrographs 8, 9, and 10 in Appendix A) occur in well clusters located in the

62

62

topographically low areas near the bottoms of drainages (Figure 2-3).

Vertical gradients indicate only the direction of vertical groundwater flow. The magnitude of flow is also a function of hydraulic conductivity and saturation. Comparisons of hydrograph trends over time were made to qualitatively assess the degree of hydraulic connection at cluster wells. Varying degrees of hydraulic connection exist between wells screened at different depths at the cluster wells. To assess this variability, hydraulic connection was classified as follows:

- Good Hydraulic Connection - hydrographs exhibit similar hydraulic heads and identical or nearly identical frequency and magnitude of water-level fluctuations
- Moderate Hydraulic Connection - hydrographs exhibit similar water-level fluctuations but show different hydraulic heads
- Poor Hydraulic Connection - hydrographs exhibit different water-level fluctuations and different hydraulic heads

Hydrographs from the 25 well cluster locations (Figure 2-3) were classified using these definitions. Only two well clusters (locations 2 and 3) exhibit good hydraulic connection. Those clusters are located in OU2 where the No. 1 sandstone is in contact with the Rocky Flats Alluvium. In this area, the lower portions of the unconsolidated surficial deposits are in hydraulic connection with bedrock to depths of at least 50 feet below ground surface based on interpretation of the hydrographs.

Two well clusters show moderate vertical hydraulic connection (locations 19 and 24). Cluster 19 is located west of the Solar Evaporation Ponds. A weathered zone in the shallow bedrock may provide a hydraulic connection from the alluvium (screened from 2 to 11 feet below ground surface) to the bedrock (screened from 19 to 37 feet). Cluster 24 is located immediately east of the Landfill Pond. At these locations, the alluvium appears hydraulically separated from the bedrock. However, several bedrock units are hydraulically connected because the water-level fluctuations can be correlated in three depth intervals spanning 90 feet of bedrock.

The remaining 22 well clusters show poor hydraulic connection. These wells are generally distributed throughout the site. The deeper hydrostratigraphic units at RFP (typically greater than 100 feet deep) are generally not in direct hydraulic connection with the upper hydrostratigraphic unit.

In summary, in topographic high areas in the vicinity of contaminant sources, such as the industrial area, all well clusters display downward gradients. However, the hydrographs suggest that vertical hydraulic connection is relatively poor (except in the OU2 area where the No. 1 sandstone exhibits relatively good hydraulic connection with the overlying unconsolidated surficial deposits). Therefore, the rate of the downward flow in contaminant source areas appears to be limited.

In areas of relatively high topographic relief, well clusters located in or near valley bottoms generally display upward gradients. These data are very limited but suggest that groundwater in the bedrock may recharge unconsolidated surficial deposits in the stream drainages. Hydrographs from these wells indicate, however, that vertical hydraulic connection is relatively poor. Therefore, flow magnitudes are likely limited.

In the eastern portion of RFP, where topographic relief diminishes, only one well cluster is located in a stream drainage. This well cluster is located along the eastern boundary next to an unnamed tributary and displays a downward gradient. These data, although limited, suggest that gaining reaches of stream drainages in areas of high relief may reverse to losing reaches farther east. This implies that unconsolidated surficial deposits may recharge bedrock in these areas.

2.2.3 *Hydraulic Conductivities*

Geologic materials at RFP can generally be placed into one of two general hydrostratigraphic groups: more permeable and less permeable. The unconsolidated surficial deposits at RFP generally have higher hydraulic conductivities and are placed in the first group. The geometric mean is used to describe the saturated hydraulic conductivity values because they tend to be log normally distributed. The Rocky Flats Alluvium and colluvium have calculated hydraulic conductivities of approximately 10^{-4} centimeters per second (cm/sec) and are in the more permeable group (Roberts, 1993). The valley-fill alluvium in Woman Creek and Walnut Creek have calculated hydraulic conductivities of 10^{-3} to 10^{-4} cm/sec, respectively, and are in the more permeable group (Roberts, 1993). The unweathered claystone bedrock usually has lower hydraulic conductivities (10^{-6} to 10^{-8} cm/sec) (Smith, 1993) and is in the less permeable group. Saturated hydraulic conductivity values in the weathered claystone and sandstone bedrock are generally higher than hydraulic conductivities in the corresponding unweathered units. However, weathered bedrock conductivities are generally less than conductivities in the unconsolidated surficial material. Saturated hydraulic conductivities range from 10^{-5} to 10^{-6} cm/sec in the weathered bedrock, which is in the more permeable group.

Hydraulic conductivity displays a wide range of variation in all geologic materials occurring at RFP. Variation in saturated hydraulic conductivity of one to two orders of magnitude is commonly reported in scientific literature (Jury, 1985). Studies are currently being conducted to better determine ranges of values and average values of hydraulic parameters for the various lithologic units at RFP.

Vertical migration of groundwater is impeded by differences in hydraulic conductivities. The unconsolidated surficial deposits, weathered bedrock, and No. 1 sandstone are characterized by higher hydraulic conductivities than the unweathered claystone bedrock. Horizontal hydraulic conductivities are much greater than vertical hydraulic conductivities across contacts between higher conductivity and lower conductivity units. For example, the contact of the lower hydraulic conductivity claystone bedrock reduces vertical groundwater flow, directing most groundwater flow laterally rather than vertically. Some water does enter the unweathered claystone bedrock. However, vertical flow rates are much less than horizontal flow rates through the more permeable units. The uppermost, more permeable lithostratigraphic units and other more permeable units hydraulically connected to those units comprise the upper hydrostratigraphic unit. When the bedrock sandstones or weathered claystone bedrock are in contact with the unconsolidated surficial deposits, a hydraulic connection may exist between these lithologic units, increasing the thickness of the upper hydrostratigraphic unit. The upper hydrostratigraphic unit only includes the bedrock sandstones or weathered claystone if the hydraulic conductivities are similar to those in the unconsolidated surficial deposits.

2.2.4 Groundwater/Surface Water Interactions

In assessing contaminant migration at RFP and interpreting regulatory requirements, it is important to characterize groundwater/surface water interactions. Groundwater and surface water are in a continuous process of exchange. Infiltration from precipitation recharges groundwater within unconsolidated surficial deposits, which in turn recharges groundwater in bedrock or other units, which eventually recharges surface water. The degree to which the surface water is recharged varies spatially and temporally. Because surface water (seeps, streams, and ponds) is interconnected to groundwater in the stream drainages, it is more appropriate to think in terms of one system rather than two. The major creeks, ditches, and ponds at RFP were investigated as potential contaminant

66

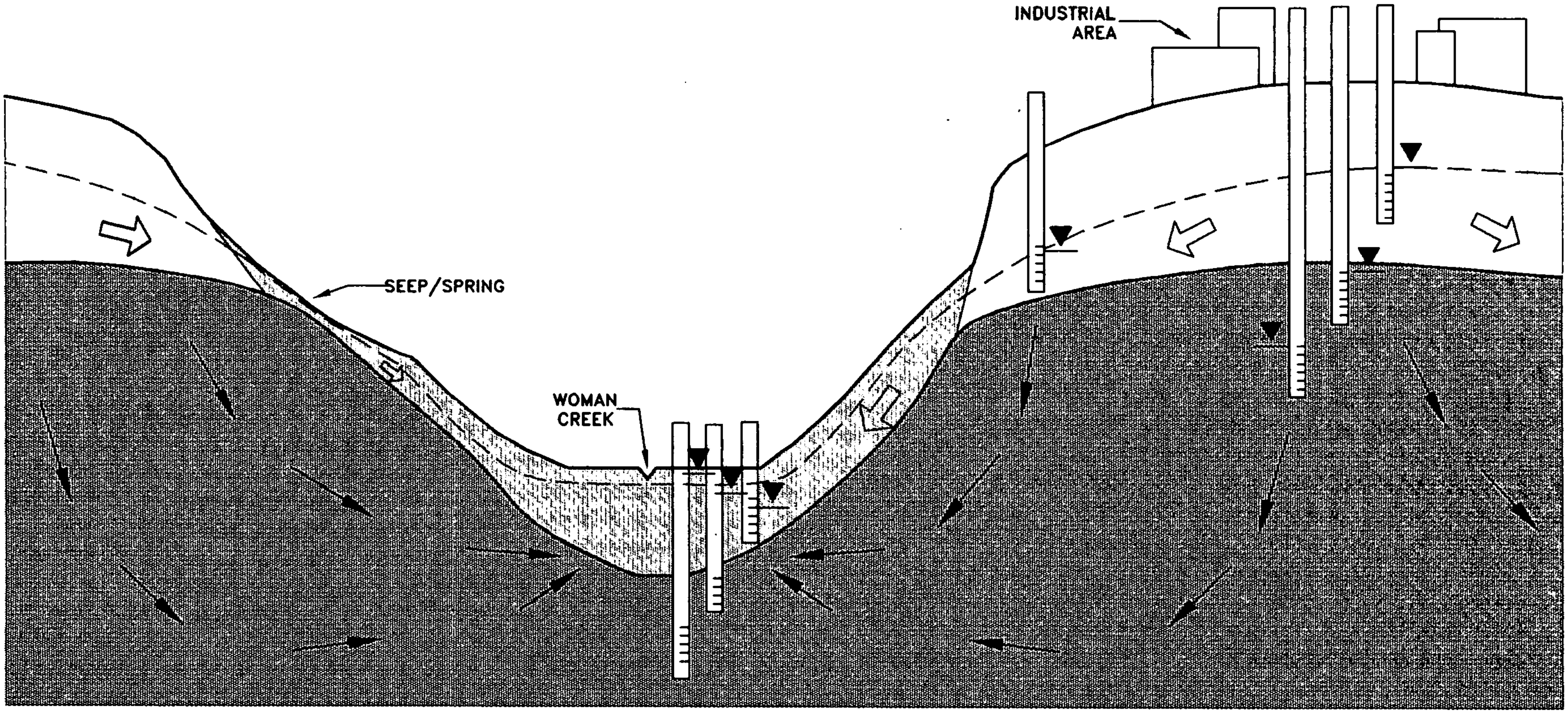
pathways by examining potentiometric data on Cross Sections A-A' through M-M" and well cluster hydrographs (Appendix A).

In semiarid regions, surface-water bodies are fed by overland flow, interflow, and baseflow. While overland flow is a major component in recharging surface water, interflow and baseflow are discussed in this section because they affect surface water directly as a result of groundwater movement.

Interflow occurs primarily when a permeable zone is underlain by a zone of relatively low permeability. Water infiltrating through the more permeable zone may accumulate above the lower permeability zone, initiating lateral flow parallel to the zone of low permeability. At RFP, interflow takes place near the unconsolidated surficial deposit/bedrock contact. In areas with thick deposits of unconsolidated surficial material, interflow may be substantial and contribute significantly to the total streamflow. The unconsolidated material typically has a higher hydraulic conductivity than the underlying bedrock, and groundwater moves downward through the unconsolidated material until lower hydraulic conductivity is encountered at bedrock. At this contact, the predominant groundwater flow is lateral, following the contact (Figure 2-4). Groundwater migrates through the higher hydraulic conductivity unit and may eventually discharge to seeps or surface water.

Much of the groundwater in the unconsolidated surficial deposits (Rocky Flats Alluvium) may discharge at seeps or into colluvium (Plates 2-11 and 2-12). This discharge occurs on hillsides where the boundary between the unconsolidated surficial deposits and the less permeable underlying claystone subcrop. In the OU2 area, a thick sandstone unit (No. 1 sandstone) is in contact with the unconsolidated surficial deposits and subcrops on the hillsides above South Walnut Creek and Woman Creek. These subcrops discharge groundwater to surface seeps and colluvium on the hillsides (Figure 2-5). Water discharged to the hillsides likely flows down through the colluvium to the valley-fill alluvium.

Groundwater discharge at RFP maintains streamflow in the creeks during dry conditions longer than would otherwise occur. The groundwater potentiometric surfaces (for unconsolidated surficial deposits) generally slop toward the creeks, and the resulting movement of groundwater is also toward the creeks. Upward vertical groundwater gradients indicate potential for groundwater in shallow bedrock to flow upward to the



EXPLANATION

(Qrf) ROCKY FLATS ALLUVIUM

(Qc) COLLUVIUM

(Kacl) BEDROCK

POTENTIOMETRIC SURFACE AT WELL

WATER TABLE

GROUNDWATER FLOW DIRECTION (ARROW SIZE INDICATES RELATIVE PERMEABILITY)

WELL OR PIEZOMETER

SCREENED INTERVAL

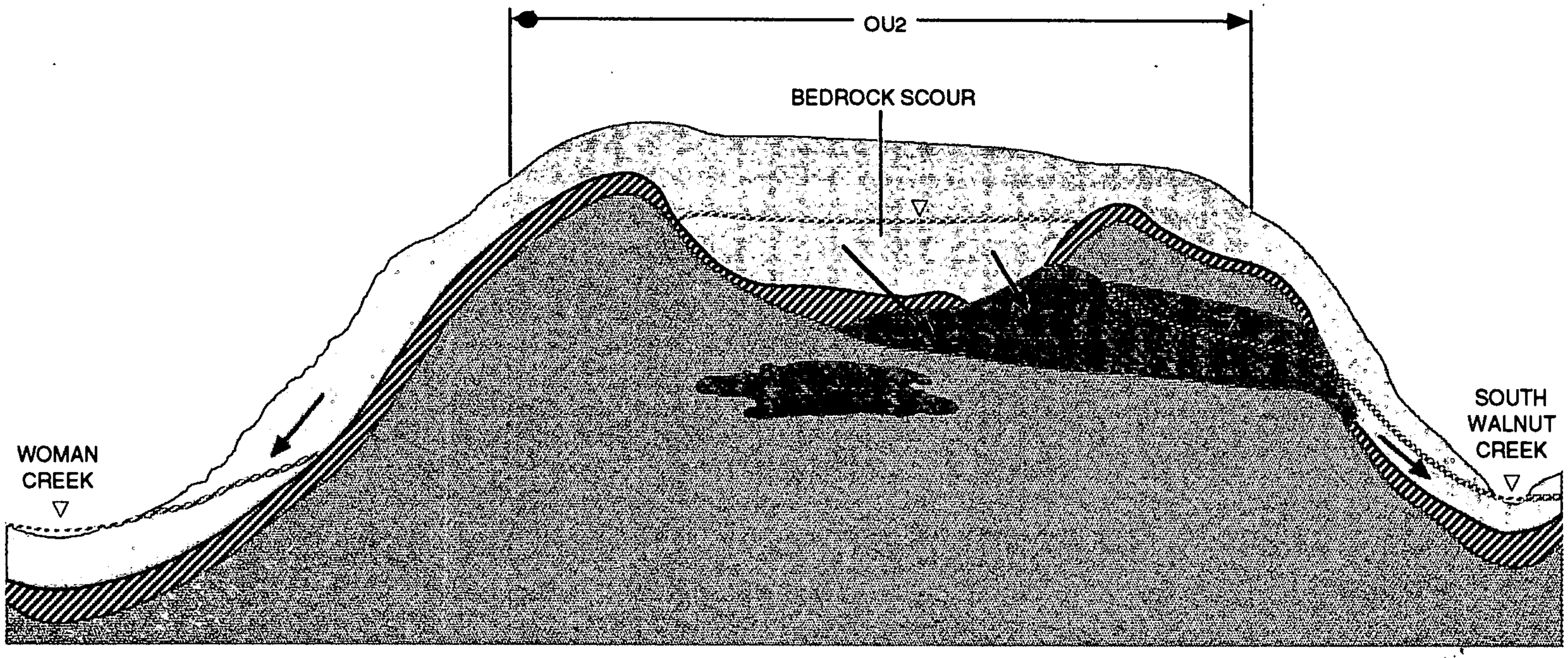
EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

CONCEPTUAL DIAGRAM OF GROUNDWATER FLOW IN INDUSTRIAL AREA AND ADJACENT DRAINAGE

Well Evaluation Report

Date: April 1994	Figure 2-4

68



EXPLANATION

(Qrf) ROCKY FLATS ALLUVIUM

(Qc) COLLUVIUM

CLAYSTONE BEDROCK

WEATHERED CLAYSTONE BEDROCK

SANDSTONE BEDROCK

GROUND WATER FLOW DIRECTION

CONCEPTUAL UHSU/LHSU BOUNDARY

WATER TABLE

DRAFT OU2 PHASE II RFI/RI

EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

SCHEMATIC CROSS SECTION OF HYDROSTRATIGRAPHY AT OU2

Well Evaluation Report

Date: April 1994	Figure 2–5

M\ES\hydrostat cross-sectn.mdw\4-12-94

69

valley-fill alluvium. As stated earlier, groundwater in the valley-fill alluvium is often hydraulically connected to surface water. Hydraulic gradients vary throughout the year, and water may move from the valley-fill alluvium to surface water or vice versa.

The baseflow recharging the creeks at RFP is related to the topography of the drainage basin. In areas with steep topography, there is potential for significant head differences between surface water and adjacent water-bearing units. This is particularly true for drainages near the eastern industrial area. The industrial area is located on a topographic high, and to the northeast, east, and southeast are North Walnut Creek, South Walnut Creek, and Woman Creek, respectively. In reviewing seasonal groundwater potentiometric data from wells in these areas, the hydraulic head of the upper hydrostratigraphic unit is consistently higher than the hydraulic head of the adjacent creeks or valley-fill alluvium. During the wet season, the water table is higher, and the resultant hydraulic gradients cause baseflow recharge into the creeks. During drier periods, the water table in the valley-fill alluvium is lower. While hydraulic gradients still slope toward the drainages, groundwater does not recharge surface streams because the water table in valley-fill alluvium is below the channel bottom.

In the upper Woman Creek drainage near the western boundary of RFP, the potentiometric surface in bedrock is near the unconsolidated surficial deposit/bedrock contact, which is less than 5 feet beneath the creek channel (Cross Sections A-A' and B'-B'). Groundwater in both the unconsolidated surficial deposits and the bedrock may be in hydraulic connection with Woman Creek in this area.

2.2.5 *Evaluation of Ponds and Dams*

Seepage through dams was assessed qualitatively using data from RFP reports (U.S. DOE, 1992b; 1992c; EG&G, 1993a; 1993b; 1993c). The seepage evaluation was based on geotechnical and hydraulic analyses of Dams A-3, B-1, B-3 and the Landfill Dam and as-built diagrams of Dams A-4, B-5, and C-2. Hydrographs showing water levels in piezometers located at Dams A-3, A-4, B-5, C-2, and the Landfill Dam were also useful in assessing the hydrology of the dams.

As-built construction diagrams of Dams A-3, A-4, B-1, B-3, B-5, C-2, and the Landfill Dam indicate that the embankment cores of these dams are keyed into bedrock (EG&G, 1993a; U.S. Doe, 1992b; 1992c). Test holes confirm that the foundation material beneath Dams A-3, A-4, and B-1 consists of consolidated claystone; and the foundation material beneath Dam B-3 and the Landfill Dam consists of consolidated silty sandstone, siltstone, and claystone. The test holes also show that the embankment core of Dams A-3, B-1, B-3, and the Landfill Dam are composed primarily of clay with minor amounts of gravelly and sandy clay (EG&G, 1993a). Cross sections show that the embankment fill changes laterally to a sandy clay at the toes of the dams (EG&G, 1993a). Lithologies of the embankment foundations and core compositions of Dams B-5 and C-2 were not described in the as-built diagrams.

The hydrographs presented at the end of Appendix A show pond elevations and water levels in piezometers monitoring Dams A-3, A-4, B-5, C-2, and the Landfill Dam. These piezometers are located on the crests and toes of the dam embankments. The crest piezometers are screened across the clay core of the embankments. The piezometers located on the downstream toe of the dams are screened across embankment fill.

Generally, water levels in piezometers located at the crests of the dams correlate well with the pond elevations, suggesting a hydraulic connection between the ponds and embankment cores. Water levels in piezometers located at the toe of the dams do not correlate with the pond elevations. Instead, the hydrographs show seasonal, cyclic fluctuations probably caused by infiltration of incident precipitation. The hydrographs show a decrease in hydraulic head from the crest to the toe at each of the dams. The presence of water in wells installed at the toes of the dams indicates that some flow through or around the embankments takes place. Flow through or around the Dam B-3 embankment was verified by a visual reconnaissance, which revealed a small seep at the toe of the downstream slope (EG&G, 1993a). Visual reconnaissance performed as part of this report also identified a seep at the southern portion of the downstream slop of Dam B-5. As a result of the absence of bedrock monitoring points below the dams, vertical flow through the embankment foundations cannot be quantified.

Hydraulic conductivity values were calculated from drawdown recovery test data obtained from piezometers at Dam A-3, B-1, B-3, and the Landfill Dam (Table 2-1) (EG&G, 1993a). Hydraulic conductivity values measured from piezometers located at

71

Table 2-1
Hydraulic Conductivity Values Obtained from Earthen Dam Piezometers

Dam Location	Piezometer Location	Hydraulic Conductivity[1] (cm/sec)
Dam A-3	TH046292 (Crest)	5.03×10^{-9}
	TH046492 (Toe)	1.17×10^{-7}
Dam B-1	TH046592 (Crest)	6.1×10^{-8}
	TH046792 (Toe)	1.73×10^{-7}
Dam B-3	TH046992 (Crest)	4.42×10^{-6}
	TH047092 (Toe)	1.17×10^{-5}
Landfill Dam	TH047292 (Crest)	1.63×10^{-8}
	TH047492 (Toe)	1.27×10^{-7}

[1] Hydraulic conductivity values measured from drawdown recovery tests using the Bouwer and Rice analytical method (EG&G, 1993a).

12

72

the crests of the dams range from 4.42 x 10^{-6} cm/sec at Dam B-3 to 5.03 x 10^{-9} cm/sec at Dam A-3. Generally, the hydraulic conductivity values measured in piezometers located at the toes of the embankments are an order of magnitude greater than the hydraulic conductivity values measured in piezometers located at the crests of the dams. These values range from 1.17 x 10^{-5} cm/sec at Dam B-3 to 1.27 x 10^{-7} cm/sec at the Landfill Dam. The higher hydraulic conductivity values measured at the toes of embankments are probably caused by a lateral change in embankment fill composition. Results of the investigation of ponds and dams are summarized as follows:

- The hydrographs show that the A-3, A-4, B-5, C-2, and Landfill Dams are partially saturated from the crest tot he downstream toe of the embankments. The hydraulic head potential from the crest to the toe of the dams suggests that some lateral seepage through the embankments is occurring.

- The hydraulic conductivity values measured in the crest piezometers, which are screened across the clay core, are relatively low (10^{-6} cm/sec to 10^{-9} cm/sec).

- Dams A-3, A-4, B-1, B-5, and C-2 are keyed into claystone bedrock. As a result of the low transmissive properties of the claystone, it is unlikely that a large volume of groundwater seeps below these dam foundations. Fine-grained sandstone and siltstone units were detected beneath the Landfill Dam and Dam B-3.

- Lateral seepage of impacted water through the dams could affect the water quality downstream.

- The degree to which impounded surface water migrates into bedrock groundwater has not been assessed, nor has the degree to which bedrock groundwater may migrate beneath the dam.

2.2.6 Conceptual Model of Groundwater Flow

A conceptual model of groundwater flow at RFP has been developed based on the hydrologic and geologic data available for the site.

Three general hydrogeologic zones have been identified extending in north-south trending bands across the site. The western zone is characterized by a relatively unbroken topographic slope across the unconsolidated surficial deposits (Rocky Flats Alluvium). The thickness of unconsolidated surficial deposits, as well as the saturated thickness is

13

73

greater in this zone than the other two zones. Water-level fluctuations are less pronounced and the surficial deposits rarely become completely unsaturated. The bedrock paleotopographic surface, ground surface, and groundwater potentiometric surface within unconsolidated surficial deposits are all roughly parallel. Groundwater flow in the surficial materials is generally from west to east. The predominantly claystone bedrock acts as a barrier to significant vertical migration of groundwater and directs flow laterally to the east in this zone.

The middle zone consists of gently eastward sloping surfaces (ground surface, bedrock paleotopographic surface, and groundwater potentiometric surface within unconsolidated surficial deposits) but is characterized by valley incision of these surfaces, resulting in eastward-trending ridges. Hillsides are generally mantled with colluvial deposits. Bedrock crops out or subcrops along the hillsides. Seeps are often associated with these crops out and shallow subcrops. Seasonal fluctuations in water level may be dramatic in the unconsolidated surficial deposits capping these ridges. Water levels in the hillside colluvium exhibit fewer fluctuations (based on water levels measured during spring and fall of 1992 at the 881 Hillside and 903 Pad areas). Hydraulic gradients in the unconsolidated surficial deposits generally slope downward to the east and are lower than the hydraulic gradients in the colluvium, which locally slope northward or southward toward the centers of the valleys.

Limited areas of unconsolidated surficial material (Rocky Flats Alluvium) capping the ridges in the middle zone frequently become unsaturated as a result of both synthetic and natural processes. The thickness of saturated hillside colluvium may also become unsaturated during low-water periods. Because of the limited saturated thicknesses of the hillside materials, the topography of the underlying bedrock (often a much less permeable hydrostratigraphic unit) plays an important role in the distribution of groundwater. Groundwater collects in depressions and small channels in the bedrock surface that may act as conduits, leaving many higher areas unsaturated. The bedrock directs the majority of this groundwater toward the valleys. Groundwater ends up in the valleys either as surface water or as groundwater in the valley-fill alluvium. The surface water and groundwater are in direct connection in these valleys during certain times of the year. Stream segments in this zone change from gaining to losing throughout the year and along different reaches of the stream. In addition, groundwater in shallow bedrock may discharge to valley-fill alluvium (i.e., upward hydraulic gradients exist in bedrock in these valleys), but further studies of vertical groundwater flow in these valleys are recommended to better understand the spatial and temporal patterns of this flow.

The middle zone is characterized by bedrock ridges, which are capped by unconsolidated surficial deposits and flanked by colluvium. The bedrock ridges have relatively lower hydraulic conductivities while the unconsolidated material has higher hydraulic conductivities and low hydraulic gradients. The colluvium tends to have higher hydraulic conductivities and gradients than bedrock deposits (see Figure 2-4). High water levels in the capping surficial deposits result in flow in the colluvium and may emerge as seeps. The potentiometric surface of the groundwater in the capping surficial deposits is relatively level, generally sloping downward to the east and also sloping slightly to the north and south toward the valley drainages. The surficial deposits are recharged directly by precipitation and also by upgradient groundwater flow. The capping unconsolidated surficial deposits discharge to the hillside colluvium and to the shallow bedrock. Water levels in the alluvium rise in the spring when recharge is greater than discharge. The alluvium desaturates when discharge to the colluvial material and shallow bedrock exceeds recharge for extended periods of time. The colluvium may also desaturate when recharge from the alluvial material and direct precipitation is not available.

In some instances, small, isolated depressions in the shallow bedrock filled with alluvial or colluvial material remain saturated during extended dry periods. These isolated regions are difficult to identify because of their limited spatial extent. The isolated nature of flow and associated contaminant transport has important implications for groundwater monitoring. Groundwater well locations should be chosen to maximize their potential for monitoring zones of isolated groundwater flow.

Preliminary results of field investigations at OU2 further indicated that the No. 1 sandstone subcrops beneath both the alluvium capping the ridge between Woman Creek and South Walnut Creek and the hillside colluvium on the side of this ridge (see Figure 2-5). This sandstone unit probably provides a conduit for groundwater flow from OU2 to the hillside colluvium and also helps dewater the overlying deposits, creating a large area of unsaturated material. This unit is important for monitoring potential contaminant transport pathways in this zone.

The easternmost zone is characterized by flatter topography (although not as flat as the westernmost zone). Rocky Flats Alluvium is not present in this zone. The eastern zone is characterized by widespread occurrence of valley-fill alluvium. Based on inferred

15

75

hydraulic gradients, groundwater in the unconsolidated surficial deposits may not flow as directly or rapidly into the less pronounced stream valleys in this zone before leaving the site. The more uniform flow in this zone indicates that a regular spacing of groundwater wells may be the most effective method for monitoring contaminant transport in these areas.

2.3 Groundwater Geochemistry

Groundwater geochemical data were analyzed to determine the sitewide extent, magnitude, spatial distribution, and temporal variation of contaminant distribution in groundwater at RFP. Temporal variations in contaminant distribution and concentration were analyzed for trends or patterns of contaminant migration. The contaminant source areas observed contaminant distributions, contaminant migration pathways, and temporal trends in the geochemical data were used to make recommendations regarding the groundwater monitoring network at RFP (Section 4.).

This section describes the construction and interpretation of the concentration contour maps. The following aspects of contaminant hydrology at RFP were evaluated using the concentration contour maps:

- Changes in the spatial distribution of contaminants, evaluated by comparing the location, areal extent, and magnitude of contamination in 1990 and 1992
- Seasonal changes groundwater quality, evaluated by comparing second and fourth quarter concentration contour maps and time trend plots based on available chemical data for numerous wells from 1989 through 1992
- Continuity and relative magnitude of contaminant distribution across the unconsolidated surficial deposits/shallow bedrock contact, assessed by comparing concentration contour maps for unconsolidated surficial deposits to those for bedrock

Maps of average (arithmetic mean) concentrations were constructed to reduce the effect of missing, erroneous, or anomalous data on plume configurations. This section also discusses the potential occurrence of dense nonaqueous phase liquids (DNAPLs), pesticides, and PCBs in groundwater.

76

76

2.3.1 Concentration Contour Map Methodolgoy

Concentration contour maps for selected analytes were constructed using second and fourth quarter data from both 1990 and 1992. Second-quarter and fourth-quarter data were chosen because they represent the high- and low-flow quarters, respectively. Data from 1992 were used because they represent the most recent complete year of data. Data from an earlier year were used for comparison with 1992 data to evaluate temporal trends. Although data from 1991 were usable, 1990 data was chosen for comparison to evaluate trends over a longer interval of time. The 1990 data represent the first full year of data collection following implementation of sampling and data quality guidelines outlined in the General Radiochemical and Routine Analytical Services Protocol (GRRASP) (EG&G, 1991d) and in task-specific Standard Operating Procedures (SOPs) (EG&G, 1992e).

The concentration contour maps represent a two-dimensional spatial inference of concentrations in groundwater based on a limited number of known data points. this inference assumes that the concentrations vary smoothly in space. Discontinuities in chemical concentrations, which may be related to isolated bedrock depressions or localized unsaturated zones, for example, cannot be inferred unless the discontinuity is larger than the interval between data points. More complete well coverage allows more accurate estimation of the spatial distribution of concentrations. In areas with limited well coverage, concentration isopleths are more subject to interpretation.

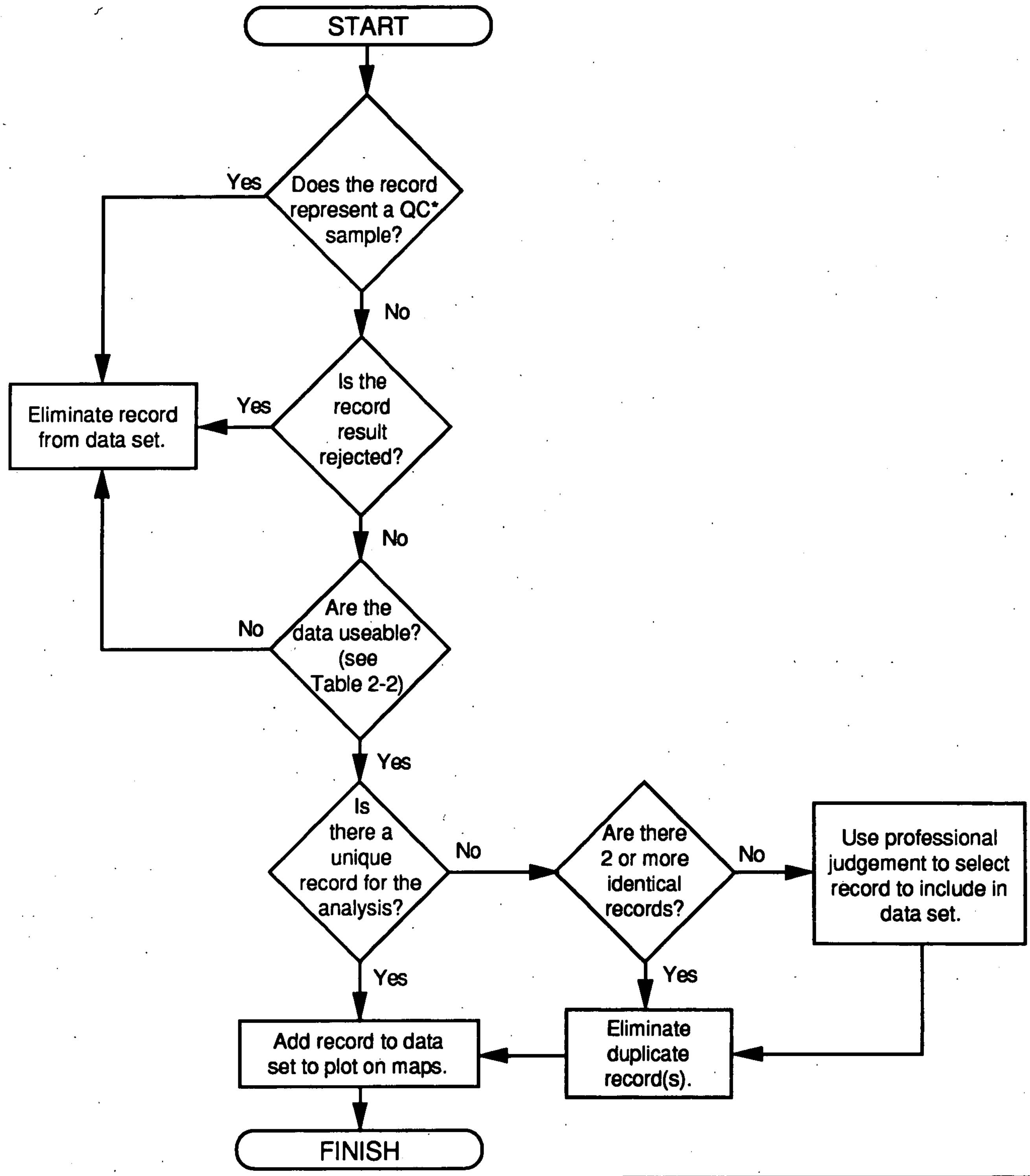
2.3.1.1 Data Quality

Analytical data describing groundwater chemistry from 1989 through first quarter 1993 were extracted from the Rocky Flats Environmental Database System (RFEDS) for the purposes of the well evaluation program. Individual data that were determined to be unusable based on a qualifier or validation code in RFEDS were not used for the construction of contour maps. Data collected prior to 1989 were not subject to the data quality guidelines of GRRASP and were not used to construct concentration contour maps.

As a result of the presence of duplicate records, quality control (QC) sample results, and rejected or otherwise unusable data, some modification to the extracted data set was generally required prior to posting the analytical results on maps. The modification process is shown in Figure 2-6. Implementation of the process results in an edited set of data that provides a single, useable analyte concentration (result) per well.

77

For each analyte, check each record using the following process:



* Quality Control (QC) samples include duplicates, trip blanks, equipment blanks, field blanks, and matrix spike samples.

M\ES\Chem Data Compilation.mdw\4-12-94

EG&G ROCKY FLATS Rocky Flats Plant, Golden, Colorado	
FLOW DIAGRAM FOR SELECTING DATA USED IN CHEMICAL CONCENTRATION CONTOUR MAPS Well Evaluation Report	
Date: April 1994	Figure 2-6

78

A slightly different process was used to compile the analytical data for maps showing the "total" concentration of VOCs. For these maps, the results for the 13 organic compounds most consistently analyzed and detected in groundwater were added together to obtain a "total" VOC concentration for each well sampled. For each quarter of interest, data were extracted from the data base for the following analytes:

- 1,1,1-trichloroethane (1,1,1-TCA)
- 1,1,2-trichloroethane(1,1,2-TCA)
- 1,1-dichloroethane (1,1-DCA)
- 1,2-dichloroethane (1,2-DCA)
- trichloroethene (TCE)
- tetrachloroethene (PCE)
- carbon tetrachloride (CCL_4)
- chloroform
- vinyl chloride
- benzene
- toluene
- total xylenes

Results qualified with an "E" (concentration exceeded calibration range of instrument) were not extracted with the other available data. Results obtained from diluted samples were only included in the dataset when the original "target" result was no available. When both a dilution and target result were reported for an analyte, the validated result was included in the data set. In cases where no validated result was available, the target result was included. Results reported with a "U" non-detect qualifier were retained in the data set but the result was systematically set to zero. The sum of the concentrations of the VOCs listed above was calculated using the edited data for each well.

Concentration contour maps of average (arithmetic mean) concentrations were constructed for TCE, PCE, dissolved gross alpha, and total dissolved solids (TDS). The arithmetic mean concentration was calculated from data collected between 1989 and fir quarter 1993. Table 2-2 was used to determine whether qualified results were useable and to assign values to results below the detection limit. Results below the detection limit were replaced with a value equal to one-half of the reported detection detection limit. An arithmetic mean concentration was calculated for each of the four analytes for each well.

Mean concentration maps are not included for lithium or selenium because over 50 percent of the data were non-detects for these parameters. when more than 50 percent of the data are non-detects, the arithmetic mean is only a measure of the average detection limit and does not provide information regarding the actual mean concentration.

2.3.1.2 Analyte Selection

The analytical suite for groundwater samples has decreased from approximately 460 analytes in 1989 to 243 analytes in 1992. In many cases, these changes reflect OU-related modifications. A subset of the total analytical suite was selected for geochemical mapping. Analytes that were most appropriate for characterizing the nature and extent of RFP-related contamination were selected. Selection of anlytes was based on one or more of the following criteria:

- historical use in RFP industrial process
- frequency of detection in groundwater
- public concern
- significance with respect to health and safety
- fate and transport characteristics
- interpretability (i.e., analytes that show a sufficient range of concentrations in groundwater to contour on maps and interpret)

80

80

Table 2-2
Laboratory Data Qualifiers and Validation Codes

Qualifier	Definition	Value Used to Compile Maps	Value for Statistical Analysis
+	inorganics: correlation coefficient for the matrix spike analysis is less than 0.995 (estimated value)	result	result
*	inorganics: duplicate analysis is not within control limts (estimated value)	result	result
A	organics: identifies tetatively identified compound (TIC) as a suspected aldol condensation product	none	not included
B	organics: warns that analyte also detected in blank *note: for common lab. contaminants include as hit if blank result > 10 x det. limit for all other organics include as hit if blank result > 5 x det. limit* inorganics: reported value is less than CRDL but greater than IDL rads: constituent also detected in associated blank whose concentration was greater than CRDL and/or minimum detectable activity (estimated value)	none result none	result result result
C	organics: pesticide result confirmed by GC/MS rads: presence of high TDS in sample increased minimum detectable activity	result result	result result
D	organics: identified in an analysis at a secondary dilution	result	result
E	organics: compound exceeded calibration range of instrument, sample must be re-analyzed inorganics: value is an estimate due to interference (estimated value)	none result	not included result
F	rads: for alpha spectrometry - FWHM exceeded acceptable limits (estimated value)	result	result
G	TOC: dilution result exceeded range of instrument, estimated result	result	result
H	rads: sample analysis performed outside of method-specified maximum holding time	result	result

81

Table 2-2
Laboratory Data Qualifiers and Validation Codes
(continued)

Qualifier	Definition	Value Used to Compile Maps	Value for Statistical Analysis
I	organics: interference with target peak (estimated value)	result	result
JB	organics: result below detection limit and analyte detected in lab. blank	result	1/2 detection limit
J	organics: MS data indicate presence of compound but below detection limit (estimated value)	result	result
	inorganics: value greater than IDL but control sample analysis not within control limits (estimated value)	result	result
L	undefined	none	none
N	organics: compound presumed present (TIC)	none	not included
	inorganics: spiked sample recovery is not within control limits (estimated value)	result	result
N*	inorganics: spiked sample recovery and duplicate analysis are not within control limits (an estimated value)	result	result
R	validation code for rejected data entered in lab qualifier field/unusable data	none	none
S	inorganics: the reported value determined by the method of standard additions	result	result
U	organics and inorganics: analyte analyzed but not detected at the quantitation limit	result	1/2 detection limit
UC	organics: pesticide result confirmed but below detection limit	result	1/2 detection limit
UE	rads: detection limit reported as result (?)	none	not included
UJ	organics: analyzed but not above the detection limit, estimated value	result	1/2 detection limit
UN	organics: compound presumed present but below detection limit	none	not included
	inorganics: spiked sample recovery not within control limits and sample result below detection limit	result	1/2 detection limit

82

Table 2-2
Laboratory Data Qualifiers and Validation Codes
(continued)

Qualifier	Definition	Value Used to Compile Maps	Value for Statistical Analysis
UW	inorganics: post-digestion spike for GFAA analysis is out of control limits and sample result is below detection limit	result	1/2 detection limit
UX		result	1/2 detection limit
V	validation code for valid data entered into lab qualifier field	result	result
W	inorganics: post-digestion spike for GFAA analysis is out of control limits while sample absorbance < 50% of spike absorbance	result	result
X	organics (pre-1992): lab software flag (combines more than one qualifier) - not defined	none	none
	inorganics (pre-1992): detection limit greater than normal, sample matrix interference	result	result
	other (OU7 RFI/RI samples): result by calculation defined in GRRASP	result	result
Y	rads: chemical yield exceeded acceptable limits (estimated value)	result	result

Qualifier	Definition	Include in Data Analysis
J	estimated result	yes
B	lab qualifier	no
C	lab qualifier	no
N	lab qualifier	no
S	lab qualifier	no
P	undefined	no
A	acceptable result	yes
JA	accepable result (for estimated value)	yes
R	rejected result	no

83

84

Table 2-2
Laboratory Data Qualifiers and Validation Codes
(continued)

Qualifier	Definition	Value Used to Compile Maps	Value for Statistical Analysis
V	valid result	yes	

Note on use of X qualifiers: X is defined in the GRRASP as a result determined by calculation not by direct laboratory analysis. Therefore, for samples analyzed during the period that GRRASP has been in effect (since January 1992) the results qualified by an X will be treated as estimated values (similar to J). For historic data, when GRRASP was not used by laboratories, an X qualifier has two definitions. For organics, the X is a flag entered manually by the laboratory, but is not defined in RFEDS. Therefore, organic results qualified by X are not considered usable data, unless a validated result is given. For inorganics, an X qualifier indicates that the detection limit for the analyte is higher than normal due to matrix interference. An inorganic qualified with an X will be treated like a J result. The X qualifier is sometimes also used with other qualifiers (i.e., UX, XJ). In these cases the meaning of X depends on the analyte and the date of the analysis.

common laboratory contaminants:	methylene chloride	
	acetone	2-butanone
	toluene	common phthalate esters

~~81~~ 84

In addition, it was determined that each of four major chemical groups (metals, radionuclides, volatile organic, and inorganic parameters) should be represented by at least one analyte. Based on these criteria, the 13 analytes selected include:

- Metals: lithium and selenium
- Radionuclides: gross alpha; gross beta; uranium-233,234; plutonium-239,240; and americium-241
- VOCs: TCE, PCE, and "total" VOCs
- Inorganic Parameters: TDS, nitrate plus nitrite, and sulfate

Analytical results for plutonium-239,240, americium-241, VOCs, sulfate, and nitrate plus nitrite, were for unfiltered groundwater. Analytical results for the remaining analytes were for filtered groundwater.

2.3.1.3 Map Construction

Concentration contour maps (Plates 2-13 through 2-25) were constructed by posting and contouring the data fore each analyte. Separate concentration contour maps were prepared for wells installed in unconsolidated surficial deposits and in shallow bedrock. For this purpose, shallow bedrock wells are defined as wells in which the top of the screened interval is within the upper 40 feet of the bedrock. This interval of bedrock includes the weathered portion, where most contamination is thought to occur. Contour maps for bedrock groundwater include wells screened in weathered and unweathered bedrock and across the unconsolidated surficial deposit/bedrock contact.

The maps were constructed to illustrate areas where analyte concentrations exceed background. For the purpose of this report, background for an analyte is defined as the 99-percent/99-percent upper tolerance limit (UTL) (EG&G, 1993d). The "plumes" shown on these maps are areas of elevated analyte concentration. In many cases, the distribution of contaminants, as shown on the map, may result from multiple sources or diffuse (non-point source) contamination. As a result, the "plume " shape and areal extent do not necessarily indicate the direction of contaminant transport.

Isopleth values were based on the range of values in the data, and chosen to delineate the farthest extent of contamination as defined by the 99-percent/99-percent UTL

85

(EG&G, 1993d). Table 2-3 summarizes isopleth values, groundwater standards, and UTL concentrations. Isopleth values are generally different for unconsolidated surficial deposit and bedrock maps.

Isopleths are solid where data constrain the extent of contamination. In areas with insufficient data to positively delineate the extent of contamination, isopleths are dashed. Isopleths are often dashed in areas with high well densities because data for some wells were not available. Data may be missing for several reasons: (1) the data may have been rejected during the validation process, (2) the well may have been dry or may not have produced enough water for a full suite of analytes, or (3) the well may not have been sampled.

Data gaps can result in plume configurations that differ from quarter to quarter. To minimize the variations caused by a lack of data, efforts were made to draw the plumes consistently. In the immediate vicinity of a plume, if historical data for a well lacking data indicate that concentrations are consistently above the value being contoured, the well was included within the plume, isopleths, and the isopleths were drawn with a dashed line. However, single-well plumes were never drawn based solely on historical data.

In general, plumes were drawn outside unsaturated areas indicated on the potentiometric-surface maps (Plates 2-11 and 2-12). In many cases, however, wells that were dry during water-level measurement contained water later during the same quarter and were sampled for geochemical parameters. Seeps depicted on potentiometric-surface maps (Plates 2-11 and 2-12) were also considered during contouring. Plumes were drawn to include the location of the seep if data indicated that the analyte was present at concentrations above the isopleth value in seep water.

Composite plume maps were created by combining individual contaminant plume maps of analytes with similar spatial distributions. The analytes were separated into four groups: TDS, SO_4, and $NO_3 + NO_2$; TCE, PCE, and "total" VOCs; and gross alpha, gross beta, uranium-233,234, and lithium. These composite plumes are presented in Plates 2-125 through 2-128.

86

Table 2-3
Specific Concentrations Pertinent to Contour Maps

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Lithium (filtered USD groundwater)	2	1990	2–13	µg/L	160/500	2500 UNC	2,500	152.2	160.5
Lithium (filtered USD groundwater)	4	1990	2–14	µg/L	160/500	2500 UNC	2,500	152.2	160.5
Lithium (filtered BR groundwater)	2	1990	2–15	µg/L	123/500/1,000/1,500	2500 UNC	2,500	99.5	123.2
Lithium (filtered BR groundwater)	4	1990	2–16	µg/L	123/500/1,000	2500 UNC	2,500	99.5	123.2
Lithium (filtered USD groundwater)	2	1992	2–17	µg/L	160/500	2500 UNC	2,500	152.2	160.5
Lithium (filtered USD groundwater)	4	1992	2–18	µg/L	160/500	2500 UNC	2,500	152.2	160.5
Lithium (filtered BR groundwater)	2	1992	2–19	µg/L	123/500/1,000/1,500	2500 UNC	2,500	99.5	123.2
Lithium (filtered BR groundwater)	4	1992	2–20	µg/L	123/500/1,000/1,500	2500 UNC	2,500	99.5	123.2
Selenium (filtered USD groundwater)	2	1990	2–21	µg/L	50/500/2,000	10 UNC	10	—	50.0
Selenium (filtered USD groundwater)	4	1990	2–22	µg/L	150/500/2,000	10 UNC	10	—	50.0
Selenium (filtered BR groundwater)	2	1990	2–23	µg/L	4/500	10 UNC	10	—	4.8
Selenium (filtered BR groundwater)	4	1990	2–24	µg/L	4/500	10 UNC	10	—	4.8
Selenium (filtered USD groundwater)	2	1992	2–25	µg/L	50/500	10 UNC	10	—	50.0
Selenium (filtered USD groundwater)	4	1992	2–26	µg/L	50	10 UNC	10	—	50.0
Selenium (filtered BR groundwater)	2	1992	2–27	µg/L	4/500	10 UNC	10	—	4.8
Selenium (filtered BR groundwater)	4	1992	2–28	µg/L	6/600	10 UNC	10	—	4.8
Gross Alpha (filtered USD groundwater)	2	1990	2–29	pCi/L	43/200	7 Woman,11 Walnut UNCRQ, X	15 X	88.4	93.9
Gross Alpha (filtered USD groundwater)	4	1990	2–30	pCi/L	43/500	7 Woman,11 Walnut UNCRQ, X	15 X	88.4	93.9
Gross Alpha (filtered BR groundwater)	2	1990	2–31	pCi/L	22/50/100	NA	15 X	19.6	22.8
Gross Alpha (filtered BR groundwater)	4	1990	2–32	pCi/L	22/50/100/200	NA	15 X	19.6	22.8
Gross Alpha (filtered USD groundwater)	2	1992	2–33	pCi/L	93	7 Woman,11 Walnut UNCRQ, X	15 X	88.4	93.9
Gross Alpha (filtered USD groundwater)	4	1992	2–34	pCi/L	93	7 Woman,11 Walnut UNCRQ, X	15 X	88.4	93.9
Gross Alpha (filtered BR groundwater)	2	1992	2–35	pCi/L	22/50	NA	15 X	19.6	22.8
Gross Alpha (filtered BR groundwater)	4	1992	2–36	pCi/L	22/50	NA	15 X	19.6	22.8

87

Table 2-3
Specific Concentrations Pertinent to Contour Maps (continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Average Gross Alpha (filtered USD groundwater)	NA	NA	2–37	pCi/L	93	7 Woman,11 Walnut UNCRQ, X	15 X	88.4	93.9
Average Gross Alpha (filtered BR groundwater)	NA	NA	2–38	pCi/L	22/100	NA	15 X	19.6	22.8
Gross Beta (filtered USD groundwater)	2	1990	2–39	pCi/L	37/100	5 Woman,19 Walnut UNCRQ, P	4 mrem/yr, P	35.6	37.3
Gross Beta (filtered USD groundwater)	4	1990	2–40	pCi/L	37/100/200	5 Woman,19 Walnut UNCRQ, P	4 mrem/yr, P	35.6	37.3
Gross Beta (filtered BR groundwater)	2	1990	2–41	pCi/L	12/50/100	NA	4 mrem/yr, P	10.7	12.2
Gross Beta (filtered BR groundwater)	4	1990	2–42	pCi/L	12/50	NA	4 mrem/yr, P	10.7	12.2
Gross Beta (filtered USD groundwater)	2	1992	2-43	pCi/L	37	5 Woman,19 Walnut UNCRQ, P	4 mrem/yr, P	35.6	37.3
Gross Beta (filtered USD groundwater)	4	1992	2–44	pCi/L	37	5 Woman,19 Walnut UNCRQ, P	4 mrem/yr, P	35.6	37.3
Gross Beta (filtered BR groundwater)	2	1992	2–45	pCi/L	12	NA	4 mrem/yr, P	10.7	12.2
Gross Beta (filtered BR groundwater)	4	1992	2–46	pCi/L	12	NA	4 mrem/yr, P	10.7	12.2
Uranium-233,234 (filtered USD groundwater)	2	1990	2–47	pCi/L	74/100	5 Woman, 10 Walnut UNCRQ	—	58.5	74.2
Uranium-233,234 (filtered USD groundwater)	4	1990	2–48	pCi/L	74/100	5 Woman, 10 Walnut UNCRQ	—	58.5	74.2
Uranium-233,234 (filtered BR groundwater)	2	1990	2–49	pCi/L	10/50/100	NA	—	9.1	10.6
Uranium-233,234 (filtered BR groundwater)	4	1990	2–50	pCi/L	10/50	NA	—	9.1	10.6
Uranium-233,234 (filtered USD groundwater)	2	1992	2–51	pCi/L	74/100	5 Woman, 10 Walnut UNCRQ	—	58.5	74.2
Uranium-233,234 (filtered USD groundwater)	4	1992	2–52	pCi/L	74	5 Woman, 10 Walnut UNCRQ	—	58.5	74.2

88

Table 2-3
Specific Concentrations Pertinent to Contour Maps
(continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Uranium-233,234 (filtered BR groundwater)	2	1992	2–53	pCi/L	10/50	NA	—	9.1	10.6
Uranium-233,234 (filtered BR groundwater)	4	1992	2–54	pCi/L	10/50	NA	—	9.1	10.6
Plutonium-239,240 (unfiltered USD groundwater)	2	1990	2–55	pCi/L	0.06/0.1	0.05 UNCRQ	15	0.06	0.06
Plutonium-239,240 (unfiltered USD groundwater)	4	1990	2–56	pCi/L	0.06/0.1	0.05 UNCRQ	15	0.06	0.06
Plutonium-239,240 (unfiltered BR groundwater)	2	1990	2–57	pCi/L	0.02	NA	15	0.01	0.02
Plutonium-239,240 (unfiltered BR groundwater)	4	1990	2–58	pCi/L	0.02/0.1/1	NA	15	0.01	0.02
Plutonium-239,240 (unfiltered USD groundwater)	2	1992	2–59	pCi/L	0.06/0.1/1/10/100	0.05 UNCRQ	15	0.06	0.06
Plutonium-239,240 (unfiltered USD groundwater)	4	1992	2–60	pCi/L	0.06/0.1/1/10/100	0.05 UNCRQ	15	0.06	0.06
Plutonium-239,240 (unfiltered BR groundwater)	2	1992	2–61	pCi/L	0.02/0.1/1	NA	15	0.01	0.02
Plutonium-239,240 (unfiltered BR groundwater)	4	1992	2–62	pCi/L	0.02/0.1/1	NA	15	0.01	0.02
Americium-241 (unfiltered USD groundwater)	2	1990	2–63	pCi/L	0.03/0.1	0.05 UNCRQ	—	0.03	0.03
Americium-241 (unfiltered USD groundwater)	4	1990	2–64	pCi/L	0.03/0.1	0.05 UNCRQ	—	0.03	0.03
Americium-241 (unfiltered BR groundwater)	2	1990	2–65	pCi/L	NONE	NA	—	0.04	0.07
Americium-241 (unfiltered BR groundwater)	4	1990	2–66	pCi/L	0.07/.1	NA	—	0.04	0.07

89

Table 2-3
Specific Concentrations Pertinent to Contour Maps
(continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Americium-241 (unfiltered USD groundwater)	2	1992	2–67	pCi/L	0.03/0.1/1/10	0.05 UNCRQ	—	0.03	0.03
Americium-241 (unfiltered USD groundwater)	4	1992	2/68	pCi/L	0.03/0.1/1/10	0.05 UNCRQ	—	0.03	0.03
Americium–241 (unfiltered BR groundwater)	2	1992	2/69	pCi/L	0.07/0.1	NA	—	0.04	0.07
Americium-241 (unfiltered BR groundwater)	4	1992	2/70	pCi/L	0.07/0.1	NA	—	0.04	0.07
Trichloroethene (USD groundwater)	2	1990	2–71	µg/L	5/10/100/1,000	2.7 UNCRQ	5	—	—
Trichloroethene (USD groundwater)	4	1990	2–72	µg/L	5/10/100/1,000	2.7 UNCRQ	5	—	—
Trichloroethene (BR groundwater)	2	1990	2–73	µg/L	5/10/100/1,000/10,000	5	5	—	—
Trichloroethene (BR groundwater)	4	1990	2–74	µg/L	5/10/100/1,000/10,000	5	5	—	—
Trichloroethene (USD groundwater)	2	1992	2–75	µg/L	5/10/100/1,000	2.7 UNCRQ	5	—	—
Trichloroethene (USD groundwater)	4	1992	2–76	µg/L	5/10/100/1,000	2.7 UNCRQ	5	—	—
Trichloroethene (BR groundwater)	2	1992	2–77	µg/L	5/10/100/1,000/10,000	5	5	—	—
Trichloroethene (BR groundwater)	4	1992	2–78	µg/L	5/10/100/1,000/10,000/150,000	5	5	—	—
Average Trichloroethene (USD groundwater)	NA	NA	2–79	µg/L	5/10/100/1,000	2.7 UNCRQ	5	—	—
Average Trichloroethene (BR groundwater)	NA	NA	2–80	µg/L	5/10/100/1,000/10,000	5	5	—	—
Tetrachloroethene (USD groundwater)	2	1990	2–81	µg/L	5/10/100	08 UNC	5	—	—
Tetrachloroethene (USD groundwater)	4	1990	2–82	µg/L	5/10/100/1,000	0.8 UNC	5	—	—
Tetrachloroethene (BR groundwater)	2	1990	2–83	µg/L	5/10/100/1,000/10,000	0.8 UNC	5	—	—
Tetrachloroethene (BR groundwater)	4	1990	2–4	µg/L	5/10/100/1,000/10,000	0.8 UNC	5	—	—
Tetrachloroethene (USD groundwater)	2	1992	2–85	µg/L	5/10/100/1,000	0.8 UNC	5	—	—
Tetrachloroethene (USD groundwater)	4	1992	2–86	µg/L	5/10/100/1,000/10,000	0.8 UNC	5	—	—
Tetrachloroethene (BR groundwater)	2	1992	2–87	µg/L	5/10/100/1,000/10,000	0.8 UNC	5	—	—
Tetrachloroethene (BR groundwater)	4	1992	2–88	µg/L	5/10/100/1,000	0.8 UNC	5	—	—

Table 2-3
Specific Concentrations Pertinent to Contour Maps (continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Average Tetrachloroethene (USD groundwater)	NA	NA	2–89	µg/L	5/10/100/1,000	0.8 UNC	5	—	—
Average Tetrachloroethene (BR groundwater)	NA	NA	2–90	µg/L	5/10/100/1,000/10,000	0.8 UNC	5	—	—
Volatile Organic Compounds (USD groundwater)	2	1990	2–91	µg/L	5/10/100/1,000	NA	NA	NA	NA
Volatile Organic Compounds (USD groundwater)	4	1990	2–92	µg/L	5/10/100/1,000	NA	NA	NA	NA
Volatile Organic Compounds (BR groundwater)	2	1990	2–93	µg/L	5/10/100/1,000/10,000	NA	NA	NA	NA
Volatile Organic Compounds (BR groundwater)	4	1990	2–94	µg/L	5/10/100/1,000/10,000	NA	NA	NA	NA
Volatile Organic Compounds (USD groundwater)	2	1992	2–95	µg/L	5/10/100/1,000/10,000	NA	NA	NA	NA
Volatile Organic Compounds (USD groundwater)	4	1992	2–96	µg/L	5/10/100/1,000/10,000	NA	NA	NA	NA
Volatile Organic Compounds (BR groundwater)	2	1992	2–97	µg/L	5/10/100/1,000/10,000	NA	NA	NA	NA
Volatile Organic Compounds (BR groundwater)	4	1992	2–98	µg/L	5/10/100/1,000/10,000/100,000	NA	NA	NA	NA
Total Dissolved Solids (USD groundwater)	2	1990	2–99	mg/L	1,082/5,000	1.25 times background	NA	1,187	1,082
Total Dissolved Solids (USD groundwater)	4	1990	2–100	mg/L	1,082/5,000	1.25 times background	NA	1,187	1,082
Total Dissolved Solids (BR groundwater)	2	1990	2–101	mg/L	1,583/10,000	1.25 times background	NA	1,422	1,583
Total Dissolved Solids (BR groundwater)	4	1990	2–102	mg/L	1,583/10,000	1.25 times background	NA	1,422	1,583

15/91

Table 2-3
Specific Concentrations Pertinent to Contour Maps
(continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Total Dissolved Solids (USD groundwater)	2	1992	2–103	mg/L	1,082/5,000	1.25 times background	NA	1,187	1,082
Total Dissolved Solids (USD groundwater)	4	1992	2–104	mg/L	1,082/5,000	1.25 times background	NA	1,187	1,082
Total Dissolved Solids (BR groundwater)	2	1992	2–105	mg/L	1,583/10,000	1.25 times background	NA	1,422	1,583
Total Dissolved Solids (BR groundwater)	4	1992	2–106	mg/L	1,583/10,000	1.25 times background	NA	1,422	1,583
Average Total Dissolved Solids (USD groundwater)	NA	NA	1–107	mg/L	1,082/5,000	1.25 times background	NA	1,187	1,082
Average Total Dissolved Solids (BR groundwater)	NA	NA	2–108	mg/L	1,583/10,000/20,000/30,000	1.25 times background	NA	1,422	1,583
Nitrate plus Nitrite (unfiltered USD groundwater)	2	1990	2–109	mg/L	5/100	N03–10, N02–1, UNC	N03–10, N02–1	9.1	5.3
Nitrate plus Nitrite (unfiltered USD groundwater)	4	1990	2–110	mg/L	5/100	N03–10, N02–1, UNC	N03–10, N02–1	9.1	5.3
Nitrate plus Nitrite (unfiltered BR groundwater)	2	1990	2–111	mg/L	3.7/100/1,000	N03–10, N02–1, UNC	N03–10, N02–1	3.1	3.7
Nitrate plus Nitrite (unfiltered BR groundwater)	4	1990	2–112	mg/L	3.7/100/1,000	N03–10, N02–1, UNC	N03–10, N02–1	3.1	3.7
Nitrate plus Nitrite (unfiltered USD groundwater)	2	1992	2–113	mg/L	5/100	N03–10, N02–1, UNC	N03–10, N02–1	9.1	5.3
Nitrate plus Nitrite (unfiltered USD groundwater)	4	1992	2–114	mg/L	5/100/1,000	N03–10, N02–1, UNC	N03–10, N02–1	9.1	5.3
Nitrate plus Nitrite (unfiltered BR groundwater)	2	1992	2–115	mg/L	3.7/100/1,000	N03–10, N02–1, UNC	N03–10, N02–1	3.1	3.7
Nitrate plus Nitrite (unfiltered BR groundwater)	4	1992	2–116	mg/L	3.7/100/1,000	N03–10, N02–1, UNC	N03–10, N02–1	3.1	3.7

92

Table 2-3
Specific Concentrations Pertinent to Contour Maps
(continued)

Analyte[1]	Quarter	Year	Plate Number	Units	Concentration Contours	Rocky Flats Groundwater Standards[2]	Colorado Groundwater Standards[2]	95% UTL[3]	99% UTL[4]
Sulfate (unfiltered USD groundwater)	2	1990	2–117	mg/L	493/1,000	250 UNC	250	354	493
Sulfate (unfiltered USD groundwater)	4	1990	2–118	mg/L	493	250 UNC	250	354	493
Sulfate (unfiltered BR groundwater)	2	1990	2–119	mg/L	887/2,000	250 UNC	250	683	887
Sulfate (unfiltered BR groundwater)	4	1990	2–120	mg/L	887/2,000	250 UNC	250	683	887
Sulfate (unfiltered USD groundwater)	2	1992	2–121	mg/L	493/1,000	250 UNC	250	354	493
Sulfate (unfiltered USD groundwater)	4	1992	2–122	mg/L	493/1,000	250 UNC	250	354	493
Sulfate (unfiltered BR groundwater)	2	1992	2–123	mg/L	887/2,000	250 UNC	250	683	887
Sulfate (unfiltered BR groundwater)	4	1992	2–124	mg/L	887/2,000	250 UNC	250	683	887

[1] USD = unconsolidated surficial deposits.
BR = bedrock.

[2] Groundwater standards from WWE, 1993 (except TDS. TDS standards from 5 CCR 1002-8 Section 3.11.5).
UNC - Applicable to unconfined groundwater only.
UNCRQ - Applicable to unconfined groundwater within Rocky Flats Alluvium and Quaternary deposits only.
RQ - Applicable to groundwater within Rocky Flats Alluvium and Quaternary deposits only.
Woman - Applies to Woman Creek.
Walnut - Applies to Walnut Creek.
X - excluding Radon and Uranium.
P - including photon emitters.
NA - not applicable.
--- not available

[3] 95% U.T.L. are rounded from EG&G 1992d.

[4] 99% U.T.L. are rounded from EG&G 1993d.

93

2.3.2 Nature and Extent of Contamination

This section provides a summary of the spatial distribution of contaminant plumes within the central RFP area and discusses spatial and temporal trends that may be indicated by the concentration contour maps. The spatial correlation of contaminant plumes extending vertically between the unconsolidated surficial deposits and shallow bedrock was evaluated, and the relative magnitude of concentrations was compared. Seasonal variations in groundwater quality are also discussed. Also included is a summary of results from the trend plot analysis ad the contaminant transport modeling. The occurrence of several isolated areas of potential contamination in the buffer zone is presented. This section concludes with results of the pesticide, PCB, and DNAPL assessments.

2.3.2.1 Distribution of Contaminants

Because of the sitewide nature of this report, a detailed examination of all aspects of contamination is not attempted. Detailed investigations of the nature and extent of contamination and factors affecting contaminant migration and distribution and discussions of historical use and disposal of the contaminant species are more appropriate at the OU-specific level of study. Such studies will result in improved resolution of groundwater plumes mapped in this report.

Groundwater contamination is most consistently detected within the OUs, as shown on the concentration contour maps (Plates 2-13 through 2-125). Wells not related to OUs and located in the buffer zone in general do not yield waters with any notable contamination. Exceptions do exist, however, and those that are most consistent are discussed in Section 2.3.2.5.

Wells located in the vicinity of the Solar Evaporation Ponds (OU4) consistently exhibit the highest concentrations or activities in groundwater of most of the selected analytes. These include metals (lithium), radionuclides (gross alpha, gross beta, and uranium-233,234), and inorganic parameters (TDS and nitrate plus nitrite). Elevated concentrations of VOCs are also found in this area. Gross alpha and TCE are present at elevated levels immediately upgradient and downgradient of the ponds.

Wells in the area of the 903 Pad, Mound, East Trenches, and East Spray Field (OU2) display the highest activities of plutonium-239,240 and americium-241 (903 Pad) and

94

94

the highest concentrations of VOCs (TCE, PCE). Inorganic parameters, most notably nitrate plus nitrite, are also present at OU2 in elevated concentrations. Groundwater from the area around the 881 Hillside (0U1) shows high concentrations of VOCs and metals, including the highest selenium concentrations.

Groundwater in the vicinity of the Present Landfill (OU7) is characterized by elevated concentrations of metals, VOCs, and inorganic parameters, and occasionally higher activities of some radionuclides (gross alpha, gross beta, uranium-233,234, plutonium-239,240, and americium-241). The Walnut Creek drainage (OU6), including South Walnut Creek, North Walnut Creek, No Name Gulch, and the associated ponds, exhibits elevated levels of inorganic parameters, metals and some radionuclides (gross alpha, gross beta, plutonium-239,240, and americium-241) in groundwater from the wells along its length. The concentrations of these analytes decrease between the confluence of the three tributaries of Walnut Creek and the wells along Walnut Creek just west of Indiana Street.

2.3.2.2 Assessment of Contaminant Distribution Trends

Concentration contour maps were used to assess seasonal variations and biannual changes in contaminant distributions and to compare contaminant distribution in the unconsolidated surficial deposits and shallow bedrock.

<u>Seasonal Variations</u>

The variation of plume configurations from second to fourth quarters of 1990 and 1992 was examined to better understand season variations in contaminant concentrations. While no consistent trend across all groups of analytes was apparent, some parameters provided preliminary indications that seasonal variations influence groundwater concentrations. Relatively mobile constituents tended to display more seasonal variation than less mobile analytes. The complexity of the hydrogeolgy at RFP and the problems of well density, dry wells, and data gaps complicates the analysis of trends in the chemical data. Data gaps occur at numerous wells during critical time periods that might assist in the determination of seasonal trends.

Seasonal variations were most consistent for TCE (Plates 2-71 through 2-80) and "total" VOCs (Plates 2-91 through 2-98). Concentration contour maps for these analytes generally indicated higher concentrations during the fourth quarter. As a

95

95

result of increased well coverage relative to 1990, seasonal variation is especially evident in 1992. Lithium, gross beta activity, and nitrate plus nitrite also exhibit the same seasonal behavior but less consistently. The concentrations of the remaining analytes did not exhibit consistent seasonal variations.

The possible seasonal behavior displayed by TCE and "total" VOCs (and to a lesser extent, lithium, gross beta activity and nitrate plus nitrite) may be controlled by decreasing volumes of groundwater from the second to the fourth quarter concentrating the more mobile constituents. Increasing concentrations of contaminants in groundwater during drier seasons would be expected to most significantly affect the analytes that are less strongly adsorbed to the aquifer media, such as VOCs, lithium and selenium, and the inorganic parameters. In general, selenium, uranium-233,234, plutonium-239,240, and americium-241 are more strongly adsorbed to the aquifer media and would be less likely to be concentrated in groundwater during dry seasons. These conclusions are only preliminary, and further data are necessary to determine whether the proposed seasonal behavior described actually exists and whether the mechanism discussed above is responsible.

This analysis of seasonal behavior was based on limited data (spring and fall data from two years). The preliminary indications provided by the existing data are useful for the immediate analysis and planning of groundwater monitoring strategies at RFP.

Biennial Comparison

Another objective of the geochemical assessment of groundwater at RFP was to evaluate changes in the spatial distribution of existing plumes by comparing the extent and magnitude of plume configurations in 1990 and 1992. These comparisons are useful to qualitatively assess contaminant migration rates in groundwater. However, increased geochemical data in 1992 resulted in higher resolution of plume boundaries than in 1990 and the maps are often not directly comparable.

Large-scale contaminant migration is not indicated by comparison of 1990 and 1992 data. In general, wells located immediately downgradient from existing plumes in 1990 did not show significantly increased contamination in 1992, indicative of contaminant migration. While larger plumes are occasionally depicted using the 1992 data, these are often the result of more extensive data collection. Examples include TCE, PCE, and plutonium-239,240 plumes in OU2. Increased data coverage in 1992 was a result of both more effective sampling of existing wells and the installation of new wells since 1990.

Comparison of Contaminant Distribution Within Unconsolidated Surficial Deposit and Bedrock Plumes

The concentration contour maps indicate that the spatial distribution of contaminants in the unconsolidated surficial deposits and shallow bedrock are correlative. Most well-defined groundwater contaminant plumes exist both in the unconsolidated surficial deposits and in bedrock. This suggests that the unconsolidated surficial deposits and the shallow bedrock are in direct hydraulic connection.

Groundwater concentrations of lithium, TCE, PCE, TDS, and nitrate plus nitrite are often higher in bedrock groundwater than concentrations in unconsolidated surficial deposits. Mean background concentrations of lithium, TDS, and nitrate plus nitrite within bedrock have been reported to exceed those within the overlying deposits (EG&G, 1992a). This may be a result of the longer residence time of groundwater in the bedrock aquifer. However, this does not explain the organic compounds displaying higher bedrock concentrations. Contradictions to the general trend can be found in the data.

The higher concentrations of TCE and OCE in bedrock groundwater are consistent with the observed vertical hydraulic gradients and the expected behavior of DNAPLs. DANPLs tend to migrate vertically through saturated materials until they encounter a layer of lower hydraulic conductivity, such as the unweathered bedrock. Higher concentrations of PCE and TCE in bedrock groundwater may indicate the presence of DNAPL in the bedrock hydrostratigraphic unit. However, DNAPLs have never been detected as free liquids in groundwater at any location at RFP.

Although the locations of contaminants in the unconsolidated surficial deposits and bedrock are correlative, the areas of highest concentrations within the two units often differ. For example, the highest concentrations of TCE in groundwater within the unconsolidated surficial deposits of OU2 occur at the 903 Pad, whereas bedrock groundwater showing the highest detection's of TCE is located in two areas. One area is to the south of the 903 Pad (within a well screened across unconsolidated surficial deposits and weathered bedrock, and there fore potentially associated with the contamination detected in groundwater within the unconsolidated surficial deposits at the 903 Pad) and one is in the easternmost portion of the East Trenches. This may

97

97

indicate multiple sources of TCE, which is likely (U.S. DOE, 1992e). An additional factor may be local geologic structures, such as bedrock depressions, low permeability zones, sandstone lenses and channels, and fracture zones that may proved local control of contaminant migration within the bedrock.

2.3.2.3 Trend Plots

Trend plots are graphs that show analytical concentrations for a specific analyte over time. these plots (Appendix D) may indicate the migration of a contaminant plume or display seasonal variations. Trend plots were constructed in the from of bar graphs for numerous wells to investigate temporal various in the geochemical data. Wells selected for preparing trend plots meet at least one of the following criteria:

- Wells with a relatively complete period of record since 1987; those wells with extended data gaps as a result of rejected laboratory results for other missing data were not selected

- Wells with high concentrations of specific analytes of interest

- Wells near or within mapped areas of contamination

- Wells in areas adjacent to mapped VOC plumes; the concentration contour maps of total VOCs were used to identify these wells.

- Bedrock wells in the vicinity of wells screened within unconsolidated surficial deposits with known contamination

Trend plots were constructed using selected analytes form each analyte group. The metals group was represented by zinc, aluminum, manganese, iron, and selenium; radionuclides included americium-241, tritium, uranium-238, and uranium-233,234; VOC analytes included TCE, TCA, PCE, DCE, 1,1-DCE, DCA, chloroform, carbon tetrachloride, methylene chloride, and vinyl chloride; inorganic parameters were represented by TDS, nitrate plus nitrite, and sulfate. For each trend plot (Appendix D), a hydrograph for the same time period was also prepared to show water table fluctuations over time (Appendix A). In general, plots of analyte concentrations and water levels over time did not indicate any clear chemical front migration or seasonal fluctuations of analyte concentrations.

The trend plots (Appendix D) did not provide evidence of regular variations in contaminant concentrations distributions with time. The problems encountered when compiling the trend plots included irregularities in chemical database management; variable quality of laboratory data; irregular sampling protocol and methods; lack of data for some wells; and limited numbers of sampling events. Data quality and the variability of low rates water-table elevation and degradation processes in the hydrostratigraphic units may have masked temporal trends. the hydrographs associated with each trend plot appeared to have large, random fluctuations in water levels, and in most cases, contaminant concentrations do not correlate with these fluctuations in water levels.

Trend plots were also used to evaluate the effectiveness of the groundwater intercept system at the 881 Hillside area (OU1). Wells were selected upgradient and downgradient of the intercept system to evaluate concentration changes after installation of the system. Twenty-three upgradient wells and 20 downgradient wells were selected for evaluation based on their proximity to the groundwater intercept system and the direction of groundwater flow in the area.

Groundwater elevation data from wells downgradient of the groundwater intercept system at the 881 Hillside were examined to determine whether or not concentration changes resulted for the presence of the intercept system. These trend plots do not reveal significant variations in concentration distributions with time. However, chemical data were limited, with 10 of the 20 wells downgradient of the system sampled less than tree times. Groundwater from downgradient wells that were more frequently sampled had detection's near or below the reported detection limits. Therefore, the data shown on the trend plots do not provide evidence for the effectiveness of the intercept system. As additional groundwater chemistry data become available through continued sampling, trends in the concentrations of contaminants may become apparent.

2.3.2.4 Isolated Areas of Potential Contamination

Several isolated areas with elevated groundwater concentrations exist at RFP. these are located at the eastern and northern boundaries of RFP and near Smart Ditch. Some of these elevated concentrations are probably a result of the intrinsic heterogeneity of groundwater geochemical parameters. However, some wells show elevated concentrations and activities of analytes that may not be naturally occurring. The first three wells that are discussed, Wells B303089, 41691, and B205589, are of interest because of their location at the boundary of RFP (see Plate 1-1 for well locations).

Well B303089, located in the southeastern corner of the buffer zone, is screened at 4.6 to 7.0 feet within weathered claystone (Appendix C). The top of the claystone is at 4.6 feet. Because the filter pack extends above the contact between claystone and unconsolidated surficial deposits, the well also receives water from the unconsolidated deposits. Because this well produces little water, it has been primarily inactive (Klotz, 1993). Waters that have been collected are of a sodium/magnesium sulfate character unlike others at RFP (EG&G, 1990a, 1992a). Of the list of 13 analytes, this well produces waters with elevated concentrations of lithium, selenium TDS, and sulfate. These waters also contain elevated gross alpha, gross beta, and uranium-233,234 activities. Because radionuclide data are available for only unfiltered groundwater from this well, radionuclide "plumes" are not evident on the contour maps; at times, radionuclide data for unfiltered groundwater (ex. U-238) are as high as those from the Solar Evaporation Ponds. A pre-RFP domestic landfill, located approximately 500 feet west (upgradient) of this well (EG&G, 1992a), may be responsible for the elevated levels of some of the nonradionuclide species. Until the landfill source has been characterized, the source of contamination at Well B303089 will be poorly understood. surface water runoff from nearby Indiana Street probably also contributes to the groundwater chemistry through the addition of dissolved road salt, oil and grease, and other constituents related to vehicle traffic and roadways. Because of the unusual waters it produces this well is currently under scrutiny an and ongoing special sampling. (Klotz, 1993; Lindberg, 1993).

Well 41691, located south of Walnut Creek and west of Indiana Street, is screened from 5.1 to 14.7 feet within valley-fill alluvium (Appendix C). The top of bedrock is 14.7 feet at this location. This well was installed to replace the now-abandoned Well 0486, which was located 12 feet north and was screened at essentially the same depth (3.5 to 14.9 feet with top of bedrock at 14.0 feet.) Data from Well 41691 ware elevated with respect to plutonium-239,240 and americium-241, while Well 0486 data are consistently and significantly lower in these analytes. These differences are notable given the proximity of the two wells and similar screened intervals. Because plutonium and americium readily adsorb to particles (such as clay and soil particulates). these species are not expected to occur as dissolved ions. The source of plutonium an americium detected in Well 41691 may be related to stream sediments.

from Walnut Creek located a short distance to the north. However, further investigation is necessary to determine the form and source(s) of these analytes.

Well B205589 is located at the northern boundary of RFP in the Rock Creek drainage adjacent to Highway 128. The well is screened from 6.9 to 16.3 feet within clay-rich surficial deposits. Well B201189, located approximately 10 feet to the south (uphill), is screened from 20.4 to 34.8 feet in surficial deposits. Top of bedrock at these locations is 32.3 and 34.0 feet, respectively. Waters from Well B205589 contain elevated activities of gross alpha (312.7 pCi/L), gross beta (135.9 pCi/L), and uranium-233,234 (199.5 pCI/L), and also contain consistently elevated concentrations of lithium (compared to the background 99/99 UTL). Waters from Well B205589 also contain almost twice the TDS and two to three times the sulfate of waters from Well B201189. The next well in an upgradient direction, B201589, is similar geochemically to B201189 in that none of these species are reported at elevated levels. Reasons for the elevated radionuclide activities and metal concentrations in Well B205589 are not known.

Bedrock well pair B304889 and B304989 is located along Smart Ditch in the southeastern buffer zone. Well B304889 is screened form 14.7 to 24.1 feet (top of bedrock at 9.2 feet) and Well B304989 is screened from 75.7 to 82.9 feet (top of bedrock at 8.4 feet). The shallower of the two produces sodium-sulfate waters that contain elevated uranium-233,234, and occasionally elevated lithium and gross beta. Reasons for these elevated concentrations and activities are not clear. They may relate to natural sources within the claystone in which this well is screened or may be caused by contamination in near by areas of from surface water or groundwater flowing through Smart Ditch.

2.3.2.5 Pesticides and PCB Assessment

The pesticide and PCB data from 1989 through first quarter 1993 were analyzed to determine the extent and magnitude of these analytes in groundwater and to evaluate which wells should be included in the network for pesticide and PCB monitoring. RFEDS was searched for detection's of pesticides and PCBs in groundwater samples. Groundwater samples form 84 wells at RFP were analyzed for pesticides or PCBs.

Data were examined with respect to the magnitude of concentration relative to detection limits, repeatability, and data quality.

Of the 84 wells identified as having been sampled for pesticides or PCBs, only five had samples with pesticide concentrations greater than the detection limit. Detection's were validated for samples form four of these five wells. These four wells (03391, 35691, 10592, and 36191) are discussed below. PCBs were not detected in any of the wells.

Well 03391 is located in OU2 near the East Trenches. the well is screened in bedrock from 29.9 to 30.9 feet. The top of bedrock is at 10.8 feet at this location. A sample collected in December 1991 contained heptachlor epoxide at 0.065 μg/l, slightly greater than the detection limit of 0.05 μg/l. Data have not been collected since this sampling event to evaluate the repeatability of this result.

Wells 35691, 10592, and 36191 are located at the 881 Hillside area (OU1). All three wells are screened in unconsolidated surficial deposits. Well 35691 is screened from 15.6 to 26.6 feet. Wells 10592 and 36191 are screened from 4.7 to 24.0 and 9.5 to 14.6 feet, respectively. Alph-BHC was detected at 0.12 μg/l in a sample collected in November 1991 at Well 35691. A sample collected in February 1992 contained beta-BHC at 0.055 μg/l at the same well. The detection limit was 0.05 μg/l for both samples. A sample taken in September 1992 from Well 10592 contained 4,4-DDD at a concentration of 1.8 μg/l compared to a detection limit of 0.095 μg/l. Well 36191 had detection's of heptachlor epoxide (0.13 μg/l) and alpha-BHC (0.082 μg/l) in November 1991. The detection limit was 0.05 μg/l in both cases.

Pesticides have not been detected that would suggest significant contamination in groundwater at RFP. The low frequency of detection and low concentrations pesticides, and the absence of detectable concentrations of PCBs indicate that continued monitoring of these analytes at RFP is probably not warranted except in areas of current pesticide usage. Resampling of the four wells discussed above should be conducted to determine whether the occurrence of pesticides in these wells can be confirmed

2.3.2.6 Dense Nonaqueous Phase Liquid Assessment

An evaluation of the potential for the occurrence of DNAPLs was made using information that describes historic waste generation, storage, and disposal practices at RFP and data describing DNAPL concentrations in groundwater as recommended by recent EPA guidance (U.S. EPA, 1992). In order to assess the potential occurrence of

DNAPLs in wells at RFP, data for selected analytes collected between 1989 and first quarter 1993 were compared to their respective solubility limits (Knox et al., 1993). DNAPL concentrations exceeding 10 percent of the solubility limit were reported for groundwaters from four wells; concentrations greater than 1 percent of the solubility limit were reported for waters from an additional 19 wells as shown in Table 2-4. As a result, there is a moderate to high probability for the occurrence of DNAPLs at RFP (U.S. EPA, 1992). Based on the frequency and magnitude of detection, DNAPLs are most likely to be present in the vicinity of Wells 0974, 0174, 3687, and 07391. Samples collected at these wells contained concentrations of at least 10 percent of the solubility limit of a DNAPL-related target analyte. However, these concentrations are not necessarily indicative of the presence of DNAPL as a free liquid. Other wells potentially impacted by DNAPL, given the detection in groundwater samples of concentrations greater than 1 percent of the solubility limits of target analytes, include 4387, 06691, P210189, 0390, 08891, 0271, 4286, and 02291.

The wells listed above are located primarily within OU1 or OU2; however, one is in OU4, and another is in OU7. In addition, one well is located northwest of OU1. Two of the four wells that produce waters with concentrations exceeding 10 percent of the solubility limit have been abandoned (0174 and 0974). Most of the wells potentially containing DNAPL are screened within unconsolidated surficial deposits; five wells, including abandoned Well 0974 and active Wells 3687, P210189, 4286, and 022291, are screened within bedrock, and one (07391) is screened across the surficial deposit/bedrock contact.

No conclusion as to the presence or absence of DNAPL at any of the wells listed in Table 2-4 can be made based on these data. The presence of DNAPL in wells can be expected to be highly variable in both space and time as a result of local geologic controls, water level fluctuations, and DNAPL migration.

2.3.2.7 Summary

Geochemical data were analyzed to determine the extent and magnitude of and temporal trends in groundwater contamination at RFP. Concentration contour maps constructed using data from 1989 to 1993 were used to assist in these evaluations. The following conclusions were reached based on this analysis:

Table 2-4
Evaluation of Wells Potentially Containing DNAPLs

Analyte	Solubility Limit (mg/L)[1]	Wells with values >10% K_s	Wells with values >1% K_s
1,1,2-TCA	4500	None	None
1,1 DCA	5500	None	None
1,1-DCE	400	0974	0974 and 4387
1,2-DCA	8690	None	None
1,2-DCE	600	None	0974
2-Butanone	27%	None	None
CCL_4	785	None	06691,0974, P210189,0390, and 08891
C_6H_5Cl	500	None	None
Chloroethane	5740	None	None
Chloroform	8200	None	None
Ethylbenzene	152	None	None
PCE	150	0174	0174,0974, 02091,08891, 4387,3687, 4286,P220089, 07391, and 02291
TCE	1100	3687 and 07391	3687,07391, 0974,0271, and 4387
Vinyl Chloride	60	None	3586
Total Xylenes	198	None	None

[1] Solubility limits from Knox, et al., 1993. The lower range of solubilities is presented and used to conservatively identify wells most likely to contain DNAPLs.

104

104

- The spatial distribution of contaminant plumes has not significantly changed from 1990 to 1992. Increased data in 1992 resulted in greater resolution of plume boundaries in some cases.

- Preliminary data indicate that some seasonal variation in groundwater concentration of selected analytes may occur. Analytes less strongly adsorbed to aquifer materials appear to exhibit more seasonal variation in concentration. This evaluation was based on limited data (spring and fall data from 2 years), and more information is needed to evaluate this process.

- At OU2 and OU4, and to a lesser degree at OU1 and OU7, the spatial distribution of groundwater contaminants in unconsolidated surficial deposits is roughly similar to the spatial distribution of contaminants in the shallow bedrock, indicating that these units may be hydraulically connected.

3. REGULATORY REQUIREMENTS FOR GROUNDWATER MONITORING

This section summarizes the current federal and state environmental regulations pertaining to groundwater monitoring at RFP. In general, these environmental regulations establish performance criteria for detecting releases of hazardous waste or hazardous waste constituents, characterizing the nature and extent of contamination to support the selection of remedial actions, and implementing source control programs to protect groundwater. Occasionally, these regulations specify the required number and locations of monitoring wells, frequency of monitoring, appropriate analytes or analytical suites, sampling and analytical protocols, and methods of data analysis (including comparisons of site data with background data). Proposed changes to the current environmental regulations and their effects on groundwater monitoring at RFP are also discussed. For a more detailed discussion of the regulatory requirements and RFP's compliance status, see the draft *Groundwater Protection Program Review* (WWE, 1993b) and the final *Groundwater Program Compliance Report* (WWE, 1993c).

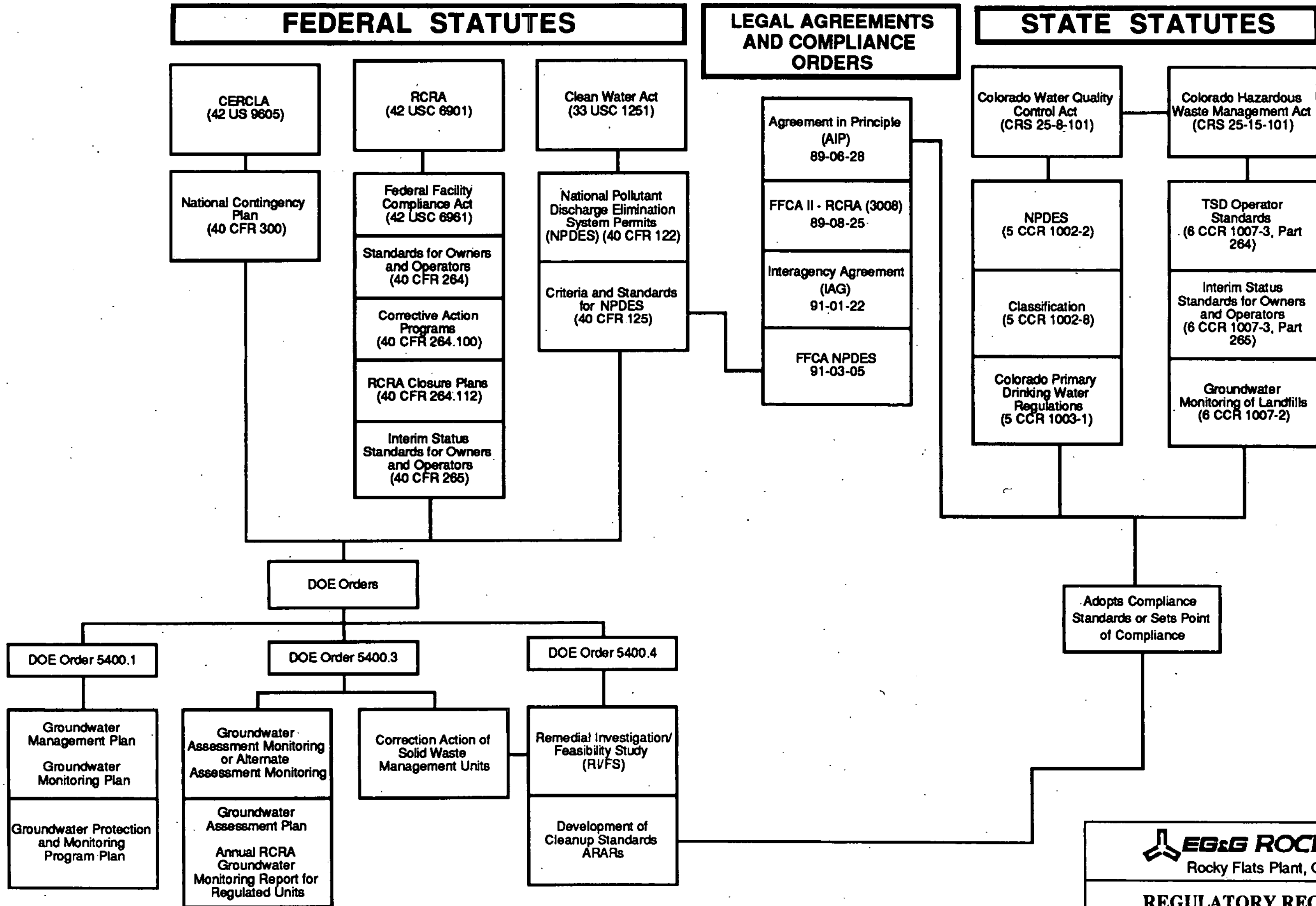
Figure 3-1 presents the major groundwater monitoring requirements imposed on RFP and links existing RFP plans and programs to these requirements in the form of a flowchart. This type of compilation accentuates overlapping or redundant requirements, identifies unique elements of individual programs, and thus allows for the development of a more cohesive groundwater monitoring program for RFP. Table 3-1 presents the well classification, sampling frequency, and analytical suites for wells at RFP that are currently monitored to satisfy regulatory requirements. Table 3-2 defines the well classification (i.e., well purpose) used in Table 3-1. In addition, Table 3-1 lists 40 wells scheduled for quarterly sampling beginning in the fourth quarter of 1993. These wells, presently monitored only for water-level data, will be sampled quarterly to provide chemical data for future CERCLA activities in the industrial area. Therefore, sampling of these wells will fulfill future regulatory requirements under CERCLA. It is assumed that groundwater samples from these wells will be analyzed for the current "standard suite" of analytes at RFP.

3.1 Federal Regulations

DOE has developed a set of orders that are used to establish the operating parameters at all DOE facilities, including requirements for groundwater monitoring and protection.

106

106



EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

REGULATORY REQUIREMENTS AFFECTING GROUNDWATER MONITORING AT THE ROCKY FLATS PLANT

Well Evaluation Report

Date: April 1994	Figure 3–1

M\ES\DocHierarchy RFP.flw\4-12-94

107

Table 3-2
Proposed Well Classifications

Proposed Classification	Description of Classification
RCRA-S	RCRA-required wells used for calculating statistics for comparisons of groundwater quality. Sampled and analyzed as specified in the Final Ground Water Assessment Plan (EG&G, 1993), and any subsequently approved changes.
RCRA-C	RCRA-required wells used for determining "the rate and extent of migration of hazardous wastes or hazardous waste constituents in the ground water." Sampled and analyzed as specified in the Final Ground Water Assessment Plan (EG&G, 1993), and any subsequently approved changes.
CERCLA	CERCLA-required wells used for characterizing groundwater at RFP Operable Units. Sampled and analyzed as specified in the applicable CERCLA RI work plans and any subsequently approved changes.
Boundary-AIP	CDH-required wells used for monitoring groundwater at down-gradient RFP site boundaries. Sampled and analyzed as specified in the Agreement In Principal (DOE, 1989) and any subsequently approved changes.
Boundary-C	RFP site boundary wells (not required by CDH) used for monitoring and characterizing groundwater at site boundaries. Sampled and analyzed as specified in the Proposed Groundwater Monitoring Plan for RFP (this document), and any subsequent changes.
Plant Protection	Wells proposed for semi-annual sampling and analysis used to monitor groundwater at RFP for source characterization or plume definition . To be sampled and analyzed in the Proposed Groundwater Monitoring Plan for RFP (this document), and any subsequent changes.
NL	CDH-required wells for permitting the new landfill. To be sampled and analyzed as specified in the Groundwater Monitoring Plan for the New Sanitary Landfill (EG&G, 1993), and any subsequently approved changes.
Inactive	Wells not currently being sampled.

DOE Orders 5400.3 and 5400.4 direct DOE to comply with the requirements of RCRA and CERCLA regulations. DOE Order 5400.1 requires that groundwater that is or could be affected by activities at a DOE facility be monitored to determine any impacts to groundwater quality and quantity. DOE orders are discussed further in Section 3.1.4.

CERCLA and RCRA represent the majority of federal requirements pertinent to the groundwater monitoring system at RFP. Because of the extensive overlap between CERCLA remediation activities and RCRA corrective actions at RFP, these programs are coordinated under an Interagency Agreement (IAG) negotiated between DOE, EPA, and CDH dated January 22, 1991 (DOE, EPA, CDH, 1991). The IAG includes a Statement of Work, which details the work to be performed in response to all hazardous substance releases or threats of releases that may cause harm to human health or the environment. The IAG also contains compliance schedules for the work to be performed during the investigatory and remedial phases of the response process. Future groundwater monitoring and characterization activities must comply with requirements of the IAG. All three types of federal requirements are discussed below.

3.1.1 CERCLA

CERCLA establishes procedural requirements for investigation and remediation of releases or potential releases of hazardous substances, pollutants, and contaminants. The IAG identifies 16 distinct source areas of contamination (i.e., OUs) that are being investigated to determine an appropriate remedial response action. Three of the OUs (the Solar Evaporation Ponds, Present Landfill, and West Spray Field) are RCRA-regulated disposal units (discussed below in Section 3.1.2) that are handled primarily under RCRA authorities. The remaining OUs are being investigated in accordance with a process designed to integrate the requirements of CERCLA and RCRA corrective actions. A lead agency and authority have been identified for each OU. Units for which the state is the lead agency can generally be considered RCRA corrective action areas; units for which EPA is the lead agency can generally be considered CERCLA sites.

112

112

These 16 OUs are listed below:

OU	Name	Lead Agency
1	881 Hillside	Joint EPA and CDH
2	903 Pad, Mound, and East Trenches	Joint EPA and CDH
3	Offsite Areas	EPA
4	Solar Evaporation Ponds	CDH
5	Woman Creek Drainage	EPA
6	Walnut Creek Drainage	EPA
7	Present Landfill and Inactive Hazardous Waste Storage Area	CDH
8	700 Area	Joint EPA and CDH
9	Original Process Waste Lines	CDH
10	Other Outside Closures	CDH
11	West Spray Field	CDH
12	400/800 Area	CDH
13	100 Area	CDH
14	Radioactive Sites	EPA
15	Inside Building Closures	CDH
16	Low-Priority Sites	CDH

The regulations governing activities under CERCLA are contained in the National Contingency Plan (NCP) codified in Part 300 of Title 40 of the Code of Federal Regulations (40 CFR Part 300) (CFR, 1992a), whereas the corrective action regulations of RCRA are found in 40 CFR Parts 264 and 265 (CFR, 1992b; 1992c). Neither program has specific groundwater monitoring requirements regarding the number and locations of wells, selection of analytes, sampling and analysis protocols, frequency of monitoring, and level of data analysis. Instead, both dictate that characterization of groundwater contamination must be adequate to determine appropriate response actions. At RFP, the groundwater monitoring requirements for each OU are specified in RCRA facility investigation/remedial investigation (RFI/RI) work plans prepared in accordance with the scope of work in the IAG, which provides guidance on the minimal level of effort necessary for investigation of each OU. When approved, these documents become enforceable requirements under the IAG. Wells used to support current and anticipated CERCLA characterization activities are listed in Table 3-1.

Identification and characterization of contamination under CERCLA requires comparisons of OU-specific data to background data. To meet the requirements of both

113 113

CERCLA and DOE Order 5400.1, three reports characterizing sitewide background values have been submitted to EPA and CDH. These include *The Background Geochemical Characterization Report for 1989* (EG&G, 1990b), *The Background Geochemical Characterization Report for 1991* (EG&G, 1992b), and *The Background Geochemical Characterization Report for 1992* (EG&G, 1993d). In addition, data from the three RCRA-regulated units are also compared to the sitewide background values presented in the *Final Background Geochemical Characterization Reports*. DOE has proposed that the 1993 report be the last because the goals of the program have been accomplished. However, as described in the *Final Groundwater Assessment Plan* (U.S. DOE, 1993), DOE intends to continue analysis of background groundwater quality data at individual RCRA-regulated units in support of RCRA activities.

3.1.2 RCRA

The CDH Hazardous Waste Management Division has authorization to implement the hazardous waste management requirements of RCRA. CDH has essentially adopted federal RCRA requirements into the Colorado Hazardous Waste Act (CHWA). Therefore, state groundwater monitoring requirements under CHWA mirror the RCRA requirements discussed below. Additional State of Colorado requirements are discussed in Section 3.2.

RCRA sets forth requirements for the treatment, storage, and disposal of hazardous wastes, including radioactive mixed wastes (i.e., wastes that are a mixture of both radioactive materials and RCRA-defined hazardous waste). RCRA has two distinct areas of regulatory authority over operating facilities. The first area includes regulations that govern units where hazardous waste is, or was, actively managed (through either treatment, storage, or disposal) since November 1980. Under this set of requirements, waste disposal areas (called regulated units), but not treatment or storage areas, are subject to a wide range of groundwater monitoring and protection requirements. The second area of regulatory authority, added to RCRA in 1984 through the Hazardous and Solid Waste Amendments, mirrors the CERCLA program and requires operating facilities to institute corrective actions for releases of hazardous wastes and constituents regardless of when the hazardous waste or constituent was released. Regulatory requirements for fully permitted RCRA facilities are presented in 40 CFR 264. Regulatory requirements for interim-status RCRA facilities/units are presented in 40 CFR 265. As of July 1993, only interim-status requirements were

114

applicable to the RCRA-regulated units at RFP. Groundwater monitoring requirements for regulated disposal areas are discussed below. Requirements for corrective action areas for hazardous constituent releases are included under the discussion on CERCLA.

Interim-status groundwater monitoring requirements are contained in 40 CFR Part 265 Subpart F (40 CFR 265.90-265.94). These regulations require installation of an interim-status groundwater monitoring system capable of determining the impact of the RCRA unit on the quality of groundwater in the uppermost aquifer underlying the facility (40 CFR 265.90). The interim-status regulations specify that the groundwater monitoring must, at all times, comply with the requirements of one of the following types of groundwater monitoring systems: (1) groundwater monitoring system (40 CFR 265.91), (2) groundwater quality assessment program (40 CFR 265.93 (d)(2)), or (3) an alternate groundwater monitoring system (40 CFR 265.90 (d)(1)).

When it is believed that a regulated unit has not affected groundwater quality, the general groundwater monitoring system satisfies the regulatory requirements. However, if groundwater contamination is known or assumed to be present, additional monitoring is required. If the owner/operator assumes that groundwater monitoring of indicator parameters in accordance with 40 CFR 265.91 and 265.92 would show statistically significant increases when evaluated under 40 CFR 265.93(b), the owner/operator must prepare and implement a groundwater assessment plan consisting of either an alternate or assessment groundwater monitoring system. The groundwater assessment plan describes the process for conducting a groundwater monitoring program that is capable of detecting releases at the point of compliance (discussed further in Section 3.1.2.3) for each regulated unit, determining the impact of the waste disposal area on the uppermost aquifer underlying the facility, and evaluating the extent and rate of movement of contaminants (40 CFR 265.91 through 40 CFR 265.94). In addition, a groundwater monitoring report must be prepared annually to present chemical data and assess the impact of the RCRA unit on groundwater.

The hazardous waste disposal areas at RFP are the Solar Evaporation Ponds, the Present Landfill, and the West Spray Field. Each of these units is currently under the interim-status groundwater monitoring requirements of 40 CFR Part 265 (CFR, 1992c). Because it was assumed that releases of hazardous constituents had occurred at the West Spray Field and the Present Landfill, an alternate groundwater monitoring system was implemented for these units as required pursuant to 40 CFR 265.90 (d). The Solar

Evaporation Ponds area is currently undergoing assessment monitoring as specified in 40 CFR 265.93(d) because it has already been established that releases from the ponds have impacted groundwater quality downgradient from the waste management unit.

A groundwater assessment plan and annual groundwater monitoring reports have been prepared for RFP RCRA-regulated units. These documents are briefly described below.

3.1.2.1 Groundwater Assessment Plan

The *Final Groundwater Assessment Plan* (U.S. DOE, 1993) was written to satisfy the requirements of 40 CFR 265.93, Part 1007-3 of Title 6 of the Code of Colorado Regulations (6 CCR 1007-3), CDH's Compliance Order CO 89-06-07-01, and CDH's concerns presented in a 1990 Notice of Violation (90-03-28-01). The *Final Groundwater Assessment Plan* describes the process for conducting the RCRA interim-status monitoring programs for the three RCRA-regulated units at RFP in addition to establishing a mechanism for implementing future modifications to the program. As described in the *Final Groundwater Assessment Plan*, future modifications to the program will be proposed in the annual RCRA monitoring reports (discussed below). Additional groundwater characterization activities recommended in the annual reports are implemented under the CERCLA site investigation activities governed by the IAG. New wells are sampled per the frequency and suite of analytes specified in the relevant RFI/RI work plan under which the monitoring well was installed. When the wells have fulfilled the CERCLA requirements specified in the work plan, the wells are evaluated for inclusion in the RCRA monitoring programs. The annual RCRA groundwater monitoring report identified wells to be retained in the RCRA monitoring program and the appropriate sampling frequency and analytical suite.

DOE also made several important commitments in this document that will further characterize groundwater contamination at the three regulated units. These commitments are to (1) develop a site-specific groundwater flow and contaminant transport model for each unit in support of risk assessment activities and evaluation of remedial action alternatives, and (2) install additional monitoring wells upgradient of the Present Landfill and Solar Evaporation Ponds to characterize site-specific background groundwater quality.

116

3.1.2.2 Annual RCRA Groundwater Monitoring Report

Part 265 of RCRA also requires submission of an annual report regarding implementation of the groundwater monitoring program. RFP has submitted a series of reports to fulfill this requirement, the latest being the *1992 Annual RCRA Groundwater Monitoring Report for Regulated Units* (EG&G, 1993c). This report consists of (1) an assessment of the presence of hazardous waste constituents associated with each unit in groundwater monitoring wells located hydraulically downgradient of the RCRA-regulated unit and (2) an evaluation of the rate of movement and extent of contamination associated with each unit. The presence of hazardous waste constituents in groundwater at each unit is assessed by statistically comparing groundwater quality data from upgradient monitoring wells with data from monitoring wells located at or downgradient of the point of compliance for each unit. The nature and extent of contamination is evaluated by assessing the spatial distribution of constituents associated with past waste practices at each unit. Where applicable, groundwater quality data within each unit is also assessed by comparing analytical data with sitewide background values for chemical constituents presented in the *1989, 1991, and 1992 Background Geochemical Characterization Reports* (EG&G, 1990b; 1992b; 1993d).

Monitoring wells at RFP used to satisfy these requirements are identified in Table 3-1. Wells identified as RCRA-S are used to obtain chemical data for statistically determining whether a release has occurred at the point of compliance. Data from wells identified as RCRA-C are used to characterize the nature, extent, and rate of movement of contamination. Collectively, data from these wells are used to assess the impact of the regulated units on groundwater quality.

The annual RCRA reports also include an assessment of the current groundwater monitoring activities, an evaluation of the effectiveness of the monitoring program, and recommendations concerning future monitoring activities at the RCRA-related units. Recommendations for additional monitoring wells for further groundwater characterization are implemented through a variety of programs at RFP, including the CERCLA investigations for the individual regulated units and sitewide investigations.

117 147

3.1.2.3 Point of Compliance

The point of compliance is a regulatory term referring to the boundary at which groundwater standards must be attained. Constituent concentrations are not to exceed designated groundwater standards beyond or downgradient of the point of compliance. RCRA regulations for permitted disposal units are clear and require a point of compliance for groundwater standards at the downgradient boundary of a regulated unit. Based on definitions contained in RCRA regulations, RFP has established the following points of compliance for the three regulated units, as described in the *Final Groundwater Assessment Plan* (U.S. DOE, 1993):

- The point of compliance for the West Spray Field is a vertical plane extending downward through the uppermost aquifer along the entire northern, southern, and eastern borders of the regulated unit.

- The point of compliance for the Solar Evaporation Ponds is a vertical plane extending downward through the uppermost aquifer along the entire northern and eastern borders, the southern border east of the ponds, and possibly the northern third of the western border of the regulated unit.

- The point of compliance for the Present Landfill is a vertical plane extending downward through the uppermost aquifer along the eastern border of the regulated unit. However, monitoring wells are not located at the compliance boundary. Instead, wells are located east of the Landfill Pond. These locations are consistent with EPA's amendment to 40 CFR 265.91 to allow alternate placement of monitoring wells hydraulically downgradient of an interim-status facility where existing physical obstacles prevent installation of wells at the compliance boundary.

Although points of compliance exist for the three RCRA-related units, a sitewide point of compliance for RFP has not yet been established.

CERCLA regulations do not explicitly specify a point of compliance for cleanup standards. The point of compliance for CERCLA is negotiated with EPA and may range from the original source area to some point outside the original facility boundary.

118

118

3.1.3 Clean Water Act

On March 25, 1991, DOE and EPA signed a Federal Facility Compliance Agreement (FFCA) (DOE, EPA, 1991), which addresses the National Pollutant Discharge Elimination System (NPDES) requirements of the Clean Water Act (CWA). Although the agreement is primarily intended to control operation of the Sanitary Treatment Plant, the agreement requires RFP to sample the vadose zone in the vicinity of the sludge drying beds at the Sanitary Treatment Plant. This monitoring program is currently in place, and data evaluation is under way.

3.1.4 Department of Energy Monitoring Requirements

DOE has issued a series of internal orders intended to govern activities at all DOE facilities. Several of these orders have major implications for groundwater protection and monitoring. Most notably, DOE Order 5400.1 (U.S. DOE, 1988) requires each facility that could impact groundwater quality or quantity to develop and implement a groundwater protection management plan and groundwater monitoring plan. RFP addressed the requirements of this order through the *Groundwater Protection and Monitoring Program Plan* (EG&G, 1992a) and earlier versions of this document. The *Groundwater Protection and Monitoring Program Plan* (EG&G, 1992a) outlines many of the programs in place or planned for controlling sources of groundwater contamination and groundwater monitoring. Some of these programs were developed in response to other federal or state regulations but nevertheless fulfill the requirements of DOE Order 5400.1. Continued compliance with this order requires the *Groundwater Protection and Monitoring Program Plan* (EG&G, 1992a) to be reviewed annually and updated every three years.

DOE Order 5400.1 requires RFP to develop a groundwater protection strategy that includes control of sources of contamination. RFP has developed a number of ongoing programs to fulfill this requirement, including:

- Use of a chemical inventory and tracking system
- Implementation of a program to inspect and evaluate over 2,000 storage tanks
- Implementation of the drain identification study to identify and remediate all building drains that may have spilled or leaked contaminants

- Implementation of the waste minimization program mandated by RCRA and CHWA

- Identification and implementation of appropriate source control measures as part of the RCRA/CERCLA investigations

- Institution of good housekeeping practices

- Establishment of an onsite Hazardous-Materials Response Team

- Implementation of an employee training and education program focused on spill prevention and rapid response

- Management of incidental water

As discussed previously, additional DOE orders affecting groundwater are DOE Orders 5400.3 (U.S. DOE, 1989a) and 5400.4 (U.S. DOE, 1989b), which direct DOE to comply with the requirements of RCRA and CERCLA. DOE Order 5400.3 requires DOE facilities to manage hazardous waste, including the hazardous portion of radioactive mixed wastes, in accordance with the requirements of RCRA. DOE Order 5400.4 requires DOE to respond to releases and potentially imminent releases of hazardous substances from any facility in compliance with the requirements of CERCLA.

3.2 State of Colorado Regulations

State requirements related to hazardous wastes or hazardous waste constituents in groundwater fall under the purview of the CHWA, the RFP Agreement in Principle (AIP), and the Colorado Water Quality Control Act, which is enforced by the Colorado Water Quality Control Commission (CWQCC). All three types of state requirements are discussed below.

3.2.1 Colorado Hazardous Waste Act

As discussed previously, the CDH Hazardous Waste Management Division has authorization to implement the hazardous waste management requirements of RCRA. CDH has essentially adopted federal RCRA requirements into the CHWA. Therefore, state groundwater monitoring requirements under CHWA mirror the RCRA requirements previously discussed. CDH also shares responsibility for overseeing activities under CERCLA and RCRA through the IAG.

3.2.2 *RFP Agreement in Principle*

Additional groundwater related requirements are imposed on RFP through the AIP signed by DOE and CDH on June 28, 1989 (DOE, CDH, 1989). The AIP requires DOE to provide the resources for independent sampling of groundwater and surface water by CDH. Routine samples are taken of groundwater in boundary wells, city drinking water, and surface water. Boundary wells sampled in accordance with the AIP are identified in Table 3-1 as Boundary-AIP. The AIP also allows CDH to review RFP monitoring programs and make recommendations for improvements. Under the AIP, DOE committed to and installed 50 additional groundwater monitoring wells in 1989. These wells were designated as piezometers, but have construction details similar to other RFP wells used for collecting groundwater samples. Water-level measurements have been taken in these piezometers under the sitewide groundwater monitoring program. Groundwater samples have been collected from 10 of these piezometers for OU-specific and RCRA groundwater monitoring requirements. As discussed previously, groundwater samples will be collected from 40 of the piezometers for one year, beginning in fourth quarter 1993, to provide chemical data for future CERCLA activities in the industrial area.

3.2.3 *Colorado Water Quality Control Commission*

The CWQCC is charged under the Colorado Water Quality Control Act with establishing groundwater classifications based on beneficial uses and assigning numeric groundwater standards (both statewide and site-specific) to ensure that the beneficial use is sustained. Some site-specific groundwater standards were assigned to RFP at a January 1991 CWQCC hearing (CDH-CWQCC, 1991a). These standards must be attained at a designated point of compliance, yet to be determined at RFP, and will likely act as the basis for cleanup standards developed under the IAG.

The CWQCC does not have an ongoing program to implement and enforce the groundwater standards. Instead, its regulations instruct the implementing agencies to enforce these standards at a designated point or points of compliance. Implementing agencies include the Hazardous Waste Management Division of CDH, the State Engineer, and the Oil and Gas Conservation Commission. However, the Colorado

Water Quality Control Act does provide the CWQCC with the authority to establish and enforce a point of compliance where the implementing agency fails to protect beneficial uses of the water or otherwise acts inconsistently with the CWA. A point of compliance for groundwater standards can also be established by EPA, under authority of RCRA or CERCLA as previously discussed. Other than the specific points of compliance forfor RCRA units, no sitewide points of compliance have been established for RFP.

3.2.3.1 Background Groundwater Quality

Background groundwater quality is an issue that is routinely considered by CWQCC when developing groundwater standards and by CDH and EPA in developing cleanup standards under RCRA and CERCLA. CWQCC may set standards at background levels when sufficient evidence is available. In the January 1991 site-specific groundwater hearing for RFP, the CWQCC decided not to set groundwater standards equal to background levels even though constituents such as gross alpha, gross beta, radium-226, uranium, sulfate, TDS, manganese, and selenium routinely exceeded the proposed groundwater standards in background alluvial groundwater. Under the final regulation (Section 3.12.0 of 5 CCR 1002-8), implementing agencies (mainly the Hazardous Waste Division of CDH and EPA) have the authority to set compliance standards on a constituent-specific basis for constituents where background levels exceed the standards (CDH-CWQCC, 1991a).

3.3 Regulatory Required Analytical Suites

A critical element of any groundwater monitoring program is the list of analytes to be monitored. The analyte requirements of the various governing regulations and agreements were reviewed and compared to RFP's current list of analytes, as outlined in the *Final Groundwater Assessment Plan* (U.S. DOE, 1993).

DOE orders impose only the requirement that parameter lists be sufficient to ensure compliance with other DOE orders and federal and state environmental regulations. CERCLA also fails to specify lists of analytes and only states that the monitoring program must be adequate to support decisions regarding the appropriate level of remedial response. RCRA, on the other hand, does contain lists of potential analytes, the selection of which depends on the status of the regulated unit. Operators of interim-status units (such as the Solar Evaporation Ponds, Present Landfill, and West Spray

122

122

Field) have the discretion to develop site-specific analyte lists, and RFP has chosen to do so. The lists should be based on hazardous waste and hazardous constituents handled at the site and an evaluation of past monitoring data. DOE has established an analyte list (Table 3-3), which is contained in the *Final Groundwater Assessment Plan* (U.S. DOE, 1993).

Permitted facilities must comply with the stricter groundwater monitoring requirements of 40 CFR Part 264. These include monitoring of groundwater, at least semiannually, for constituents listed in Appendix IX of 40 CFR Part 264 and provided in Table 3-4. RFP is currently meeting the interim-status requirements for analyte lists.

The state groundwater standards issued by the CWQCC (Tables 3-5 through 3-9) also represent an appropriate list of analytes for monitoring, although presently, there is no specific requirement to monitor them. When RFP has a regulated discharge to groundwater, the groundwater standards will effectively become enforceable. In addition, these standards could ultimately serve as groundwater cleanup standards. The list of complete groundwater standards is similar to the Appendix IX constituents in RCRA Part 264 (CFR, 1992b), thus making monitoring for both compatible. For ease of comparison, analytes routinely monitored by RFP are flagged in Tables 3-4 through 3-9.

3.4 Proposed Regulations and Policies Potentially Affecting Groundwater Monitoring at RFP

Several major federal environmental statutes are scheduled for reauthorization over the next one to two years, including the CWA, RCRA, and CERCLA. It is difficult to predict changes in groundwater policy that may come out of reauthorization until final bills are sent to Congress; however, some preliminary information regarding policy trends is available.

Representative Peter Defazio (Oregon) introduced a bill on July 1, 1993, that would explicitly regulate radioactive materials defined under the Atomic Energy Act as pollutants under the CWA. Representative Defazio intends to attach his bill to the CWA reauthorization. The bill would authorize EPA to regulate radioactive discharges from DOE and other federally owned facilities into groundwater and surface water (ENR, 1993). Because surface water and groundwater standards promulgated by the CWQCC are already based on CWA water quality criteria, this bill may not add

123

123

Table 3-3
Chemical Constituents Routinely Monitored in Groundwater at RFP
(From *Final Ground Water Assessment Plan, U.S. DOE, 1993*)

RFP Routine Analytes	RCRA, Part 264 Appendix IX Compound	State Groundwater Standards
Field Parameters		
pH		
Specific Conductance		
Temperature		
Dissolved Oxygen		X[1]
Alkalinity		
Turbidity		
Water Level		
Indicators		
Total Dissolved Solids (TDS)[2]		
pH[3]		X
Metals [4]		
Aluminum (Al)		X
Antimony (Sb)	X	
Arsenic (As)	X	X
Barium (Ba)	X	X
Beryllium (Be)	X	X
Cadmium (Cd)	X	X
Calcium (Ca)		
Chromium (Cr)[5]	X	X
Cobalt (Co)	X	X
Copper (Cu)	X	X
Iron (Fe)		X
Lead (Pb)	X	X
Magnesium (Mg)		X
Manganese (Mn)		X
Mercury (Hg)	X	X
Nickel (Ni)	X	X
Potassium (K)		
Selenium (Se)	X	X
Silver (Ag)	X	X
Sodium (Na)		

124

124

Table 3-3
Chemical Constituents Routinely Monitored in Groundwater at RFP
(From *Final Ground Water Assessment Plan, U.S. DOE, 1993*)
(continued)

Thallium (Tl)	X	
Vanadium (V)	X	X
Zinc (Zn)	X	X
Cesium (Cs)		
Lithium (Li)[6]		X
Strontium (Sr)		X
Tin (Sn)	X	
Anions		
Carbonate (CO_3)		
Bicarbonate (HCO_3)		
Chloride (Cl)		X
Sulfate (SO_4)		X
Nitrate/Nitrite (NO_2/NO_3)		X
Cyanide (as N)[7]		X
Organics[8] - Target Compound List - Volatiles		
Chloromethane (CH_3Cl)	X	X
Bromomethane (CH_3Br)	X	X
Vinyl Chloride (C_2H_3Cl)	X	X
Chlorethane (C_2H_5Cl)	X	
Methylene Chloride (CH_2Cl_2)	X	X
Acetone	X	
Carbon Disulfide	X	
1,1-Dichloroethane (1,1-DCA)	X	
1,1-Dichloroethene (1,1-DCE)	X	X
1,2-Dichloroethene (total) (total 1,2-DCE)	X	X
Chloroform ($CHCl_3$)	X	X
1,2-Dichloroethane (1,2-DCA)	X	X
2-Butanone (MEK)	X	
1,1,1-Trichloroethane (1,1,1-TCA)	X	X
Carbon Tetrachloride (CCL_4)	X	X
Vinyl Acetate	X	
Bromodichloromethane	X	X
1,1,2,2-Tetrachloroethane	X	X

125

Table 3-3
Chemical Constituents Routinely Monitored in Groundwater at RFP
(From *Final Ground Water Assessment Plan, U.S. DOE, 1993*)
(continued)

1,2-Dichloropropane (1,2-DCP)	X	X
trans-1,3-Dichloropropene	X	X
Trichloroethene (TCE)	X	X
Dibromochloromethane	X	X
1,1,2-Trichloroethane	X	X
Benzene	X	X
cis-1,3-Dichloropropene	X	X
Bromoform (CBr_4)	X	X
2-Hexanone	X	
4-Methyl-2-pentanone	X	
Tetrachloroethene (PCE)	X	X
Toluene (C_7H_8)	X	X
Chlorobenzene (C_6H_5CL)	X	X
Ethyl Benzene	X	X
Styrene	X	
Total Xylenes	X	
Radionuclides[9]		
Gross Alpha		X[10]
Gross Beta		X[11]
Uranium 233+234 (U-233, -234)		X[12]
Uranium 235 (U-235)		X[12]
Uranium 238 U-238)		X[12]
Americium 241 (AM-241)		X[13]
Plutonium 239 + 240 (Pu-239,-240)		X[14]
Strontium 89 + 90 (Sr-89,-90)[15]		X[16]
Radium 226 (Ra-226)[17]		X[18]
Radium 28 (Ra-228)[19]		X[18]
Cesium 137 (Cs-137)[20]		
Tritium		X

126

126

Table 3-3
Chemical Constituents Routinely Monitored in Groundwater at RFP
(From *Final Ground Water Assessment Plan, U.S. DOE, 1993*)
(continued)

1 DOE has instructed EG&G to remove dissolved oxygen as a required field parameter for selected wells.
2 Total suspended solids and phosphate were analyzed in 1986 only.
3 Not analyzed prior to 1989.
4 Filtered groundwater .
5 Chromium (VI) was analyzed during fourth quarter 1987 only.
6 Prior to 1989, lithium was only analyzed fourth quarter 1987 and first quarter 1988.
7 Cyanide was not analyzed during fourth quarter 1987.
8 Not analyzed in background samples in 1989.
9 Filtered groundwater (except plutonium, americium, and tritium).
10 A statewide groundwater standard exists for gross alpha particle activity (excluding radon and uranium). Big Creek Segments 4 and 5 site-specific groundwater standards exist for gross alpha activity.
11 A statewide groundwater standard exists for gross beta and photon emitters. Big Dry Creek Segments 4 and 5 site-specific groundwater standards exist for gross beta activity.
12 Big Dry Creek Segments 4 and 5 site-specific groundwater standards exist for "uranium" (i.e., total of all isotopes).
13 Big Dry Creek Segments 4 and 5 site-specific groundwater standards exist for "americium" (i.e., total of all isotopes).
14 A statewide groundwater standard exists for plutonium 238, 239, and 240. Big Dry Creek Segments 4 and 5 site-specific groundwater standards exist for "plutonium" (i.e., total of all isotopes).
15 Samples from first quarter 1988 not analyzed for Sr-89,90.
16 A statewide groundwater standard exists for strontium 90.
17 Analyzed only if gross alpha activity is greater than 5 pCi/l. Not analyzed prior to 1989.
18 A statewide groundwater standard exists for radium 226 and 228.
19 Analyzed only if Ra-226 activity is greater than 3 pCi/l. Not analyzed prior to 1989.
20 A statewide groundwater standard does not exist for Cs-137; however, a statewide groundwater standard does exist for Cs-134.

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL ($\mu g/L$)[6]
Acenaphthene	83-32-9	Acenaphthylene, 1,2-dihydro-	8100 8270	200 10
Acenaphthylene	208-96-8	Acenaphthylene	8100 8270	200 10
Acetone	67-64-1	2-Propanone	8240	100
Acetophenone	98-86-2	Ethanone, 1-phenyl-	8270	10
Acetonitrile; Methyl cyanide	75-05-8	Acetonitrile	8015	100
2-Acetylaminofluorene; 2-AAF	53-96-3	Acetamide, N-9H-fluoren-2-yl-	8270	10
Acrolein	107-02-8	2-Propenal	8030 8240	5 5
Acrylonitrile	107-13-1	2-Propenenitrile	8030	5
Aldrin	309-00-2	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1α,4α,4aβ,5α,8α,8aβ)-	8040 8270	5 10
Allyl chloride	107-05-1	1-Propene, 3-chloro-	8010 8240	5 100
4-Aminobiphenyl	92-67-1	[1,1'-Biphenyl]-4-amine	8270	10
Aniline	62-53-3	Benzenamine	8270	10
Anthracene	120-12-7	Anthracene	8100 8270	200 10
Antimony	(Total)	Antimony	6010 7040 7041	300 2,000 30
Aramite	140-57-8	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methyl-ethyl ester	8270	10
Arsenic	(Total)	Arsenic	6010 7060 7061	500 10 20
Barium	(Total)	Barium	6010 7080	20 1,000
Benzene	71-43-2	Benzene	8020 8240	2 5
Benzo[a]anthracene; Benzanthracene	56-55-3	Benzo[a]anthracene	8100 8270	200 10
Benzo[b]fluoranthene	205-99-2	Benz[e]acephenanthrylene	8100 8270	200 10
Benzo[k]fluoranthene	207-08-9	Benzo[k]fluoranthene	8100 8270	200 10

128

128

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
Benzo[ghi]perylene	191-24-2	Benzo[ghi]perylene	8100 8270	200 10
Benzo[a]pyrene	50-32-8	Benzo[a]pyrene	8100 8270	200 10
Benzyl alcohol	100-51-6	Benzene, methanol	8270	20
Beryllium	(Total)	Beryllium	6010 7090 7091	3 50 2
alpha-BHC	319-84-6	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5β,6β)-.	8080 8250	0.05 10
beta-BHC	319-85-7	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2β,3A,4β,5α,6β)-.	8080 8250	0.05 40
delta-BHC	319-86-8	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3α,4β,5α,6β)-.	8080 8250	0.1 30
gamma-BHC; Lindane	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α,2α,3β,4α,5α,6β)-.	8080 8250	0.05 10
Bis(2-chloroethoxy) methane	111-91-1	Ethane, 1,1'-[methylenebis (oxy)]bis[2-chloro-	8270	10
Bis(2-chloroethyl)ether	111-44-4	Ethane, 1,1'-oxybis[2-chloro-	8270	10
Bis(2-chloro-1-methyl-ethyl)ether; 2,2'-Di-chlorodiisopropyl ether	108-60-1	Propane, 2,2'-oxybis[1-chloro-	8010 8270	100 10
Bis(2-ethylhexyl) phthalate	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester	8060 8270	20 10
Bromodichloromethane	75-27-4	Methane, bromodichloro-	8010 8240	.15
Bromoform; Tribromomethane	75-25-2	Methane, tribromo-	8010 8240	25
4-Bromophenyl phenyl ether	101-55-3	Benzine, 1-bromo-4-phenoxy-	8270	10
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	8060 8270	5 10
Cadmium	(Total)	Cadmium	6010 7130 7131	40 50 1
Carbon disulfide	75-15-0	Carbon disulfide	8240	5

129

129

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
Carbon tetrachloride	56-23-5	Methane, tetrachloro-	8010	1
			8240	5
Chlordane	57-74-9	4,7-Methano-1H-indene,	8080	0.1
		1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-	8250	10
p-Chloroaniline	106-47-8	Benzenamine, 4-chloro-	8270	20
Chlorobenzene	108-90-7	Benzene, chloro-	8010	2
			8020	2
			8240	5
Chlorobenzilate	510-15-6	Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester	8270	10
p-Chloro-m-cresol	59-50-7	Phenol, 4-chloro-3-methyl	8040	5
			8270	20
Chloroethane; Ethyl chloride	75-00-3	Ethane, chloro-	8010	5
			8240	10
Chloroform	67-66-3	Methane, trichloro-	8010	0.5
			8240	5
2-Chloronaphthalene	91-58-7	Naphthalene, 2-chloro	8120	10
			8270	10
2-Chlorophenol	95-57-8	Phenol, 2-chloro	8040	5
			8270	10
4-Chlorophenyl phenyl ether	7005-72-3	Benzene, 1-chloro-4-phenoxy-	8270	10
Chloroprene	126-99-8	1,3-Butadiene,2-chloro-	8010	50
			8240	5
Chromium	(Total)	Chromium	6010	70
			7190	500
			7191	10
Chrysene	218-01-9	Chrysene	8100	200
			8270	10
Cobalt	(Total)	Cobalt	6010	70
			7200	500
			7201	10
Copper	(Total)	Copper	6010	60
			7210	200
m-Cresol	108-39-4	Phenol, 3-methyl-	8270	10
o-Cresol	95-48-7	Phenol, 2-methyl-	8270	10
p-Cresol	106-44-5	Phenol, 4-methyl-	8270	10
Cyanide	57-12-5	Cyanide	9010	40

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
2,4-D; 2,4-Dichlorophenoxy-acetic acid	94-75-7	Acetic acid, (2,4-dichlorophenoxy)-	8150	10
4,4'-DDD	72-54-8	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	8080 8270	0.1 10
4,4'-DDE	72-55-9	Benzene, 1,1'-(dichloroethenylidene)bis[4-chloro-	8080 8270	0.05 10
4,4'-DDT	50-29-3	Benzene, 1,1'-(2.2.2-trichloroethylidene)bis[4-chloro-	8080 8270	0.1 10
Diallate	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl)ester	8270	10
Dibenz[a,h]anthracene	53-70-3	Dibenz[a,h]anthracene	8100 8270	200 10
Dibenzofuran	132-64-9	Dibenzofuran	8270	10
Dibromochloromethane;	124-48-1	Methane, dibromochloro-	8010 8240	1 5
Chlorodibromomethane; 1,2-Dibromo-3-chloro-propane; DBCP	96-12-8	Propane, 1,2-dibromo-3-chloro	8010 8240 8270	100 5 10
1,2-Dibromoethane; Ethylene dibromide	106-93-4	Ethane, 1,2-dibromo-	8010 8240	10 5
Di-n-butyl phthalate	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester	8060 8270	5 10
o-Dichlorobenzene	95-50-1	Benzene, 1,2-dichloro-	8010 8020 8120 8270	2 5 10 10
m-Dichlorobenzene	541-73-1	Benzene, 1,3-dichloro-	8010 8020 8120 8270	5 5 10 10
p-Dichlorobenzene	106-46-7	Benzene, 1,4-dichloro-	8010 8020 8120 8270	2 5 15 10
3,3'-Dichlorobenzidine	91-94-1	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	8270	20
trans-1,4-Dichloro-2-butene	110-57-6	2-Butene, 1,4-dichloro, (E)-	8240	5
Dichlorodifluoro-methane	75-71-8	Methane, dichlorodifluoro-	8010 8240	10 5

131 131

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
1,1-Dichloroethane	75-34-3	Ethane, 1,1-dichloro-	8010 8240	1 5
1,2-Dichloroethane; Ethylene dichloride	107-06-2	Ethane, 1,2-dichloro-	8010 8240	0.5 5
1,1-Dichloroethylene; Vinylidene chloride	75-35-4	Ethene, 1,2-dichloro-	8010 8240	1 5
trans-1,2-Dichloroethylene	156-60-5	Ethene, 1,2-dichloro-, (E)-	8010 8240	1 5
2,4-Dichlorophenol	120-83-2	Phenol, 2,4-dichloro-	8040 8270	5 10
2,6-Dichlorophenol	87-65-0	Phenol, 2,6-dichloro-	8270	10
1,2-Dichloropropane	78-87-5	Propane, 1,2-dichloro-	8010 8240	0.5 5
cis-1,3-Dichloropropene	10061-01-5	1-Propene, 1,3-dichloro-, (Z)-	8010 8240	20 5
trans-1,3-Dichloropropene	10061-02-6	1-Propene, 1,3-dichloro-, (E)-	8010 8240	5 5
Dieldrin	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aα,3β,6β,6aα,7β,7aα)-	8080 8270	0.05 10
Diethyl Phthalate	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	8060 8270	5 10
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	8270	10
Dimethoate	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester	8270	10
p-(Dimethylamino) azobenzene	60-11-7	Benzenamine,N,N-dimethyl-4-(phenylazo)-	8270	10
7,12-Dimethylbenz[a]-anthracene	57-97-6	Benz[a]anthracene, 7,12-dimethyl-	8270	10
3,3-Dimethylbenzidine	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	8270	10
alpha, alpha-Dimethylphene-thylamine	122-09-8	Benzeneethanamine, α,α-dimethyl-	8270	10
2,4-Dimethylphenol	105-67-9	Phenol, 2,4-dimethyl	8040 8270	5 10
Dimethyl phthalate	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester	8060 8270	5 10

132

133

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
m-Dinitrobenzene	99-65-0	Benzene, 1,3-dinotro-	8270	10
4,6-Dinitro-o-cresol	534-52-1	Phenol, 2-methyl-4,6-dinitro-	8040 8270	150 50
2,4-Dinitrophenol	51-28-5	Phenol, 2,4-dinitro	8040 8270	150 50
2,4-Dinitrotoluene	121-14-2	Benzene, 1-methyl-2,4-dinitro-	8090 8270	0.2 10
2,6-Dinitrotoluene	606-20-2	Benzene, 2-methyl-1,3-dinitro-	8090 8270	0.1 10
Dinoseb; DNBP; 2-sec-Butyl-4,6-dinitrophenol	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	8150 8270	1 10
Di-n-octyl phthalate	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester	8060 8270	30 10
1,4-Dioxane	123-91-1	1,4-Dioxane	8015	150
Diphenylamine	122-39-4	Benzenamine, N-phenyl-	8270	10
Disulfoton	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester	8140 8270	2 10
Endosulfan I	959-98-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide,(3α,5aβ,6α,9α,9aβ)-	8080 8250	0.1 10
Endosulfan II	33213-65-9	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro- 1,5,5a,6,9,9a-hexahydro-, 3-oxide,(3α,5aα,6β,9β,9aα)-	8080	0.05
Endosulfan sulfate	1031-07-8	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro- 1,5,5a,6,9,9a-hexahydro-, 3,3-dioxide,	8080 8270	0.5 10
Endrin	72-20-8	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aα,2β,2aβ,3α,6α,6aβ,7β,7aα)-	8080 8250	0.1 10
Endrin aldehyde	7421-93-4	1,2,4-Methenocyclopenta[cd]pentalene-5-carboxaldehyde, 2,2a,3,3,4,7-hexachlorodecahydro-, (1α,2β,2aβ,4β,4aβ,5β,6aβ,6bβ,7R*)-	8080 8270	0.2 10
Ethylbenzene	100-41-4	Benzene, ethyl-	8020 8240	2 5
Ethyl methacrylate	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester	8015 8240 8270	10 5 10
Ethyl methanesulfonate	62-50-0	Methanesulfonic acid, ethyl ester	8270	10

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
Fampur	52-85-7	Phosphorothioic acid, O-[4[(dimethylamino)sulfonyl]phenyl]-O,O-dimethyl ester	8270	10
Fluoranthene	206-44-0	Fluoranthene	8100	200
			8270	10
Fluorene	86-73-7	9H-Fluorene	8100	200
			8270	10
Heptachlor	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	8080	0.05
			8270	10
Heptachlor epoxide	1024-57-3	2,5-Methano-2H-indeno[1,2-b]oxirene, 2,3,4,5,6,7,7-heptachloro-1a,1b,5,5a,6,6a-hexahydro-, (1aα,1bβ,2α,5α,5aβ,6β,6aα)	8080	1
			8270	10
Hexachlorobenzene	118-74-1	Benzene, hexachloro-	8120	0.5
			8270	10
Hexachlorobutadiene	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	8120	5
			8270	10
Hexachlorocyclo-pentadiene	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	8120	5
			8270	10
Hexachloroethane	67-72-1	Ethane, hexachloro-	8120	0.5
			8270	10
Hexachlorophene	70-30-4	Phenol, 2,2'-methylenebis[3,4,6-trichloro-	8270	10
Hexachloropropene	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-	8270	10
2-Hexanone	591-78-6	2-Hexanone	8240	50
Indeno(1,2,3-cd)pyrene	193-39-5	Indenol[1,2,3-cd]pyrene	8100	200
			8270	10
Isobutyl alocohol	78-83-1	1-Propanol, 2-methyl-	8015	50
Isodrin	465-73-6	1,4,5,6-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a hexahydro-(1α,4α,4aβ,5β,8β,8aβ)-	8270	10
Isophorone	78-59-1	2-Cyclohexen-1-one,3,5,5-trimethyl-	8090	60
			8270	10
Isosafrole	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-	8270	10
Kepone	143-50-0	1,3,4-Methano-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-	8270	10
Lead	(Total)	Lead	6010	40
			7420	1,000
			7421	10
Mercury	(Total)	Mercury	7470	2
Methacrylonitrile	126-98-7	2-Propenenitrile, 2-methyl-	8015	5
			8240	5

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
Methapyrilene	91-80-5	1,2,Ethanediamine, N,N-dimethyl-N'2-pyridinyl-N'-(2-thienyl-methyl)-	8270	10
Methoxychlor	72-43-5	Benzene,	8080	2
		1,1'-(2,2,2,trichloroethylidene)bis[4-methoxy-	8270	10
Methyl bromide;	74-83-9	Methane, bromo-	8010	20
Bromomethane			8240	10
Methyl chloride;	74-87-3	Methane, chloro-	8010	1
Chloromethane			8240	10
3-Methylcholanthrene	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	8270	10
Methylene bromide;	74-95-3	Methane, dibromo-	8010	15
Dibromomethane			8240	5
Methylene chloride;	75-09-2	Methane, dichloro-	8010	5
Dichloromethane			8240	5
Methyl ethyl ketone;	78-93-3	2-Butatone	8015	10
MEK			8240	100
Methyl iodide;	74-88-4	Methane, iodo-	8010	40
Iodomethane			8240	5
Methyl methacrylate	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester	8015	2
			8240	5
Methyl methanesulfonate	66-27-3	Methanesulfonic acid, methyl ester	8270	10
2-Methylnaphthalene	91-57-6	Naphthalene, 2-methyl-	8270	10
Methyl parathion;	298-00-0	Phosphorothioic acid, O,O-dimethyl O-(4-	8140	0.5
Parathion methyl		nitrophenyl)ester	8270	10
4-Methyl-2-pentanone;	108-10-1	2-Pentanone, 4-methyl-	8015	5
Methyl isobutyl ketone			8240	50
Naphthalene	91-20-3	Naphthalene	8100	200
			8270	10
1,4-Naphthoquinone	130-15-4	1,4-Naphthalenedione	8270	10
1-Naphthylamine	134-32-7	1-Naphthalenamine	8270	10
2-Naphthylamine	91-59-8	2-Naphthalenamine	8270	10
Nickel	(Total)	Nickel	6010	50
			7250	400
o-Nitroaniline	88-74-4	Benzenamine, 2-nitro-	8270	50
m-Nitroaniline	99-09-2	Benzenamine, 3-nitro-	8270	50
p-Nitroaniline	100-01-6	Benzenamine, 4-nitro-	8270	50
Nitrobenzene	98-95-3	Benzene, nitro	8090	40
			8270	10

135

135

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
o-Nitrophenol	88-75-5	Phenol, 2-nitro	8040 8270	5 10
p-Nitrophenol	100-02-7	Phenol, 4-nitro-	8040 8270	10 50
4-Nitroquinoline 1-oxide	56-57-5	Quinoline, 4-nitro-,1-oxide	8270	10
N-Nitrosodi-n-butylamine	924-16-3	1-Butanamine, N-butyl-N-nitroso-	8270	10
N-Nitrosodiethylamine	55-18-5	Ethanamine, N-ethyl-N-nitroso-	8270	10
N-Nitrosodimethylamine	62-75-9	Methanamine, N-methyl-N-nitroso-	8270	10
N-Nitrosodiphenylamine	86-30-6	Benzenamine, N-nitroso-N-phenyl-	8270	10
N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	1-Propanamine, N-nitroso-N-propyl-	8270	10
N-Nitrosomethyl-ethylamine	10595-95-6	Ethanamine, N-methyl-N-nitroso	8270	10
N-Nitrosomorpholine	59-89-2	Morpholine, 4-nitroso-	8270	10
N-Nitrosopiperidine	100-75-4	Piperidine, 1-nitroso-	8270	10
N-Nitrosopyrrolidine	930-55-2	Pyrrolidine, 1-nitroso-	8270	10
5-Nitro-o-toluidine	99-55-8	Benzenamine, 2-methyl-5-nitro-	8270	10
Parathion	56-38-2	Phosphorothioic acid, O,O-diethyl-O-(4-nitrophenyl)ester	8270	10
Polychlorinated biphenyls; PCBs[7]	See Note 7	1,1'-Biphenyl, chloro derivatives	8080 8250	50 100
Polychlorinated dibenzo-p-dioxins; PCDDs	See Note 8	Dibenzo[b,e]dioxin, chloro derivatives	8280	0.01
Polychlorinated dibenzofurans; PCDFs	See Note 9	Dibenzofuran, chloro derivatives	8280	0.01
Pentachlorobenzene	608-93-5	Benzene, pentachloro-	8270	10
Pentachloroethane	76-01-7	Ethane, pentachloro-	8240 8270	5 10
Pentachloronitro-benzene	82-68-8	Benzene, pentachloronitro-	8270	10
Pentachlorophenol	87-86-5	Phenol, pentachloro-	8040 8270	5 50
Phenacetin	62-44-2	Acetamide, N-(4-ethoxyphenyl)	8270	10
Phenanthrene	85-01-8	Penanthrene	8100 8270	200 10
Phenol	108-95-2	Phenol	8040 8270	1 10
p-Phenylenediamine	106-50-3	1,4-Benzenediamine	8270	10

136

136

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (μg/L)[6]
Phorate	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl]ester	8140 8270	2 10
2-Picoline	109-06-8	Pyridine, 2-methyl-	8240 8270	5 10
Pronamide	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	8270	10
Propionitrile; Ethyl cyanide	107-12-0	Propanenitrile	8015 8240	60 5
Pyrene	129-00-0	Pyrene	8100 8270	200 10
Pyridine	110-86-1	Pyridine	8240 8270	5 10
Safrole	94-59-7	1,3-Benzodioxole,4-(2-propenyl)-	8270	10
Selenium	(Total)	Selenium	6010 7740 7741	750 20 20
Silver	(Total)	Silver	6010 7760	70 100
Silvex; 2,4,5-TP	93-72-1	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	8150	2
Styrene	100-42-5	Benzene, ethenyl-	8020 8240	1 5
Sulfide	18496-25-8	Sulfide	9030	10,000
2,4,5-T; 2,4,5-Trichlorophenoxyacetic acid	93-76-5	Acetic acid. (2,4,5-trichlorophenoxy)-	8150	2
2,3,7,8-TCDD; 2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746-01-6	Dibenzo[b,e][1,4]dioxin, 2,3,7,8-tetrachloro-	8280	0.005
1,2,4,5-Tetrachlorobenzene	95-94-3	Benzene, 1,2,3,4-tetrachloro-	8270	10
1,1,1,2-Tetrachloro-ethane	630-20-6	Ethane, 1,1,1,2-tetrachloro-	8010 8240	5 5
1,1,2,2-Tetrachloroethane	79-34-5	Ethane, 1,1,2,2-tetrachloro	8010 8240	0.5 5
Tetrachloroethylene; Perchloroethylene; Tetrachlorothene	127-18-4	Ethene, tetrachloro-	8010 8240	0.5 5
2,3,4,6-Tetrachlorophenol	58-90-2	Phenol, 2,3,4,6-tetrachloro-	8270	10

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
Tetraethyl dithiopyrophosphate; Sulfotepp	3689-24-5	Thiodiphosphoric acid ($[(HO)_2P(S)]_2O$), tetraethyl ester	8270	10
Thallium	(Total)	Thallium	6010	400
			7840	1,000
			7841	10
Tin	(Total)	Tin	7870	8,000
Toluene	108-88-3	Benzene, methyl-	8020	2
			8240	5
o-Toluidine	95-53-4	Benzenamine, 2-methyl-	8270	10
Toxaphene	8001-35-2	Toxaphene	8080	2
			8250	10
1,2,4-Trichlorobenzene	120-82-1	Benzene, 1,2,4-trichloro-	8270	10
1,1,1-Trichloroethane; Methylchloroform	71-55-6	Ethane, 1,1,1-trichloro-	8240	5
1,1,2-Trichloroethane	79-00-5	Ethane, 1,1,2-trichloro-	8010	0.2
			8240	5
Trichloroethylene; Trichloroethene	79-01-6	Ethene, trichloro-	8010	1
Trichlorofluoro-methane	75-69-4	Methane, trichlorofluoro-	8010	10
			8240	5
2,4,5-Trichlorophenol	95-95-4	Phenol, 2,4,5-trichloro-	8270	10

Table 3-4

RCRA, APPENDIX IX, Part 264 - GROUNDWATER MONOTORING LIST[1]

Common name[2]	CAS RN[3]	Chemical abstracts service index name[4]	Suggested Methods[5]	PQL (µg/L)[6]
2,4,6-Trichlorophenol	88-06-2	Phenol, 2,5,6-trichloro	8040	5
			8270	10
1,2,3-Trichloropropane	96-18-4	Propane, 1,2,3-trichloro-	8010	10
			8240	5
O,O,O-Triethyl phosphorothioate	126-68-1	Phosphorothioic acid, O,O,O-triethyl ester	8270	10
sym-Trinitrobenzene	99-35-4	Benzene, 1,3,5-trinitro-	8270	10
Vanadium	(Total)	Vanadium	6010	80
			7910	2,000
			7911	40
Vinyl acetate	108-05-4	Acetic acid, ethenyl ester	8240	5
Vinyl chloride	75-01-4	Ethene, chloro-	8010	2
			8240	10
Xylene (total)	1330-20-7	Benzene, dimethyl-	8020	5
			8240	5
Zinc	(Total)	Zinc	6010	20
			7950	50

[1]The regulatory requirements pertain only to the list of substances; the right hand columns (Methods and PQL) are given for informational purposes only. See also footnotes 5 and 6.

[2]Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

[3]Chemical Abstracts Service registry number. Where "Total" is entered, all species in the ground water that contain this element are included.

[4]CAS index names are those used in the 9th Cumulative Index.

[5]Suggested Methods refer to analytical procedure numbers used in EPA Report SW-846 "Test Methods for Evaluating Solid Waste", third edition, November 1986. Analytical details can be found in SW-846 and in documentation on file at the agency. CAUTION: The methods listed are representative SW-846 procedures and my not always be the most suitable methods(s) for monitoring an analyte under the regulations.

[6]Practical Quantitation Limits (PQLs) are the lowest concentrations of analytes in ground waters that can be reliably determined within specified limits of precision and accuracy by the indicated methods under routine laboratory operating conditions. The PQLs listed are generally stated to one significant figure.

CAUTION: the PQL values in many cases are based only on a general estimate for the method and not on a determination for individual compounds; PQLs are not a part of the regulation.

[7]Polychlorinated biphenyls (CAS RN 1336-36-3); this category contains congener chemicals, including constituents of Aroclor-1016 (CAS RN 12674-11-2), Aroclor 1221 (CAS RN 11104-28-2), Aroclor-1232 (CAS RN 11141-16-5), Aroclor-1242 (CAS RN 53469-21-9), Aroclor-1248 (CAS RN 12672-29-6), Aroclor-1254 (CAS RN 11097-69-1), and Aroclor 1260 (CAS RN 11096-82-5). The PQL shown is an average value for PCB congeners.

Table 3-5
2 Flats Groundwater Standards Comparison - Physical and Biological[1]

(Surface water standards from Colorado WQCC regulations §3.86 and 3.8.36
Groundwater standards based upon Colorado WQCC regulations §3.12.7(1)(c) Tables 1 and 2)

Parameter	Big Dry Segment 4	Big Dry Segment 5	Statewide Groundwater	Rocky Flats Groundwater[2]	PQL
Floating Solids	"free from"	"free from"	-----	-----	-----
Settleable Solids	"free from"	"free from"	-----	-----	-----
Taste, Color, Odor	"free from"	"free from"	15 color, 3 odor	15 color, 3 odor	-----
Dissolved Oxygen mg/L*	5.0	5.0	-----	-----	-----
pH*	6.5-9.0	6.5-9.0	6.5-8.5	6.5-8.5	-----
Fecal Coliform / 100mL	2000	2000	-----	-----	-----
Total Coliform / 100mL	-----	-----	<1	<1	-----
Foaming Agents mg/L	-----	-----	0.5	0.5	-----

*Analytes routinely monitored under RFP *Ground Water Assessment Plan (GWAP).*

[1] From WWE, 1993.
[2] Applicable to unconfined groundwater only.

141

Table 3-6
Rocky Flats Groundwater Standards Comparison - Metals (mg/L) [1,1]

(Surface water standards from Colorado WQCC Regulations §3.8.6, §3.8.36 and §3.1.11.
Groundwater standards based upon Colorado WQCC Regulations §3.11.5; §3.8.36; §3.8.6; and §3.1.11.)

Parameter	Big Dry Segment 4[1]	Big Dry Segment 5[1]	Statewide Groundwater	Rocky Flats Groundwater[2]	PQL
Aluminum*	-----	-----	5.0	5.0	-----
Arsenic*	0.05 (Trec)	0.05 (Trec)	0.05	0.05	-----
Barium*	-----	-----	1.0	1.0	-----
Beryllium*	0.004[3]	0.004[3]	0.1	0.1	0.001[4]
Cadmium*	TVS	TVS	0.01	0.01	0.002[4]
Chromium*	-----	-----	0.05	0.05	-----
Chromium III (Trec)	0.05	0.05	-----	-----[5]	0.01[4]
Chromium VI	11	11	-----	TVS[5]	-----
Cobalt*	-----	-----	0.05	0.05	-----
Copper*	TVS	0.023 (Trec)[6]	0.2	0.2	-----
Iron*	0.3	0.3	0.3	0.3	-----
Iron (Trec)	1.0	13.2[6]	-----	-----	-----
Lead*	TVS	0.02[6]	0.05	0.05	-----
Lithium*	-----	-----	2.5	2.5	-----
Manganese*	0.05	0.56[6]	0.05	0.05	-----
Manganese (Trec)	1.0	1.0	-----	-----	-----
Mercury*	0.00001	0.00001	0.002	0.002	0.0005[4]
Nickel*	TVS	TVS	0.2	0.2	0.05[4]
Selenium*	0.01 (Trec)	0.01 (Trec)	0.01	0.01	-----
Silver*	TVS	TVS	0.05	0.05	-----
Vanadium*	-----	-----	0.1	0.1	-----
Zinc*	TVS	0.35 (Trec)[6]	2.0	2.0	-----

* Analytes routinely monitored under RFP *Ground Water Assessment Plan* (GWAP).

142

Ta[illegible]-6
Rocky Flats Groundwater Standards Comparison - Metals (mg/L)[1,2]
(Continued)

[1] All standards are chronic unless noted otherwise. TVS = table value standard which includes chronic and acute standards. TVS values may be hardness dependant.
[2] Applicable to unconfined groundwater only.
[3] Beryllium, see §3.8.36 pg. 138.
[4] PQL derived from Integrated Risk Information System (IRIS).
[5] Standard applies to the Rocky Flats Alluvium and Quaternary deposits only. Numerical standards for Segment 4 are applied to the shallow aquifer because they contribute water to Walnut and Woman Creeks, which the WQCC has protected with more stringent standards §3.12.10 "*Numerical Standards.*"
[6] Temporary modification which applies until April 1, 1996.

Table 3-7
Rocky Flats Groundwater Standards Comparison - Inorganics (mg/L)[1,2]

(Surface water standards from Colorado WQCC Regulations §3.8.6, §3.8.36 and §3.1.11.
Groundwater standards based upon Colorado WQCC Regulations §3.11.5; §3.8.36; §3.8.6; and §3.1.11.)

Parameter	Big Dry Segment 4[3]	Big Dry Segment 5[3]	Statewide Groundwater	Rocky Flats Groundwater[4]	PQL
Ammonia (un-ionized)	0.10	1.8/0.7[5]	-----	0.10[6]	-----
Ammonia (un-ionized)	TVS (ac)	-----	-----	TVS[6] (ac)	-----
Asbestos (fibers/l)	30,000	30,000	-----	30,000[6]	-----
Boron	0.75	0.75	0.75	0.75	-----
Chloride*	250	250	250	250	-----
Chlorine, Residual	0.019 (ac)	0.019 (ac)	-----	0.019 (ac)[6]	-----
Chlorine, Residual	0.011	0.011	-----	0.011[6]	-----
Cyanide (free)*	0.005	0.005	0.2	0.2	-----
Fluoride	2.0	2.0	2.0	2.0	-----
Sulfide (as H_2S)	0.002	0.002	-----	0.002[6]	-----
Nitrate	10	10	10	10	-----
Nitrite	0.5	0.5	1.0	1.0	-----
Sulfate*	250	250	250	250	-----

* Analytes routinely monitored under RFP Ground Water Assessment Plan (GWAP).

1 From WWE, 1993.
2 All standards are dissolved concentrations unless noted otherwise. Trec = total recoverable.
3 All standards are chronic unless noted otherwise. TVS = table value standard, ac = acute.
4 Applicable to unconfined groundwater only.
5 Temporary modification which applies until April 1, 1996. [§3.8.36 (E)(2), §3.1.7 (1)(b)(ii) and §3.8.6 Table 3, Big Dry Creek Segment 5.] First number applies March 1 - June 30, second number applies July 1 - April 30. [§3.8.6 Table 3, Big Dry Creek, Segment 5.]
6 Standards apply to unconfined groundwater within the Rocky Flats Alluvium and Quaternary deposits only. Standards do not apply to the unconfined groundwater in the Aparahoe and Laramie-Fox Hills Formation, §3.12.7(1)(b).

144

Table 3-8
Rocky Flats Groundwater Standards Comparison - Radionuclides (pCi/L)[1]

(Surface water standards from Colorado WQCC Regulations §3.8.6, §3.8.36 and §3.1.11.
Groundwater standards based upon Colorado WQCC Regulations §3.11.5; §3.8.36; §3.8.6; and §3.1.11.)

Parameter	Big Dry Segment 4[2,3]	Big Dry Segment 5[2,3]	Statewide Groundwater	Rocky Flats Groundwater[2]	PQL[4]
Americium*	0.05/0.05	0.05/0.05	-----	0.05/0.05[5]	0.2
Cesium 134[6]	80	80	80	80	10
Gross Alpha*	7/11	7/11	15[7]	7/11[5,7]	15
Gross Beta*	5/19	5/19	4 mrem/yr[8]	5/19[5,8]	30
Plutonium*	0.05/0.05	0.05/0.05	15	0.05/0.05[5]	0.2
Radium 226 and 228*	5	5	5	5	5
Strontium 90*	8	8	8	8	5
Thorium 230 and 232	60	60	60	60	-----
Tritium*	500/500	500/500	20,000	500/500[5]	400
Uranium*	5/10	5/10		5/10[5]	5

* Analytes routinely monitored under RFP *Ground Water Assessment Plan (GWAP)*.

[1] From WWE, 1993.
[2] When two values are given, the first value applies to Woman Creek and the second value applies to Walnut Creek, §3.11.5 C.2.
[3] Temporay modification of ambient quality effective until 12/31/94. Values shown are temporary standards, §3.8.6, Table 2.
[4] Colorado Department of Health Analytical Radiochemistry Workshop in Practical Quantification Levels, January 10, 1992, Draft Final
[5] Standards apply to unconfined groundwater within the Rocky Flats Alluvium and Quaternary deposit only. Standards do not apply to the unconfined groundwater in the Arapahoe and Laramie-Fox Hills Formation, §3.12.7 (1)(c)(ii), Table 6.
[6] Cesium 137 is listed as an analyte in the GWAP; however, Cesium 134 has regulatory standards.
[7] Gross alpha particle activity, excluding Radon and Uranium.
[8] Gross Beta and photon emitters not to exceed 4 mrem/yr to organ or body as the sum of the annual dose equivalent, Table 1, §3.12.7(1)(c)(iv), footnote "e".

145

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (µg/L)[1,2,3]

(Surface water standards from Colorado WQCC Regulations §3.8.6, §3.8.36 and §3.1.11.
Groundwater standards based upon Colorado WQCC Regulations §3.11.5; §3.8.36; §3.8.6; and §3.1.11.)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment 5	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
4-Chloro-3-methylphenol	59-50-7	30 (ac)	30 (ac)		30 (ac)[10]		50
Acenaphthlyene (PAH)[11]	208-96-8	0.0028	0.0028		0.0028		10
Acenapthene	83-32-9	520	520		520[10]		10
Acrolein	107-02-8	21	21		21[10]		10
Acrylonitrile[12]	107-13-1	0.058	0.058		0.058	0.058	15
Aldicarb	116-06-3	10	10	10	10	10	10[13]
Aldrin	309-00-2	0.00013	0.00013	0.002	0.0000784	0.0000784	0.1[14]
Anthracene (PAH)[11]	120-12-7	0.0028	0.0028		0.0028		1
Atrazine[12]	1912-24-9	3	3		3	3	1
Benzene*	71-43-2	1	1	1	1	1	1
Benzidine	92-87-5	0.00012	0.00012	0.0002	0.00012	0.00012	10
Benzo(A)anthracene (PAH)[11]	56-55-3	0.0028	0.0028		0.0028		10
Benzo(A)pyrene (PAH)[11]	50-32-8	0.0028	0.0028		0.0028		10
Benzo(B)fluoranthene (PAH)[11]	205-99-2	0.0028	0.0028		0.0028		10
Benzo(G,H,I)perylene (PAH)[11]	191-24-2	0.0028	0.0028		0.0028		10
Benzo(K)fluoranthene (PAH)[11]	207-08-9	0.0028	0.0028		0.0028		10
BHC Hexachlorocyclohexane	608-73-1	100 (ac)	100 (ac)		100 (ac)[10]		0.05[14]
Bromodichloromethane (HM)[15]*	75-27-4	0.3	0.3	0.3	0.3	0.3	1
Bromoform (HM)[15]*	75-25-2	4	4	4	4	4	1
Butylbenzylphthalate	85-68-7	3000	3000		3000[10,16]		10
Carbofuran	1563-66-2	36	36	36	36	36	
Carbon Tetrachloride*	56-23-5	0.25	18[17]	0.3	0.25[10,16]	0.3	1[14]

1146

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (µg/L)[1,2]
(continued)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment [5]	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
Chlordane[18]	57-74-9	0.00058	0.00058	0.03	0.00046	0.00046	0.1
Chlorethyl Ether (BIS-2)	111-44-4	0.03	0.03	0.03	0.03	0.03	10
Chlorobenzene*	108-90-7	100	100	100	100	100	1
Chloroform (HM)[15] *	67-66-3	6	6	6	0.19	0.19	1
Chloroisopropyl Ether (BIS-2)	39638-32-9	1400	1400		1400[10,16]		10
Chloroethyl Ether (BIS-2)[19]	111-44-4	0.03	0.03		0.0000037	0.0000037	10
Chloromethyl Ether (BIS)[18,20]	542-88-1	0.0000037	0.0000037		0.0000037		10
Chlorophenol[21]	---	2000	2000		1	1	50
Chlorophenol 2[21]	95-57-2	2000	2000		2000[10]		50
Chloropyrifos	2921-88-2	0.041	0.041		0.041[10]		0.1[14]
Chrysene (PAH)[11]	218-01-9	0.0028	0.0028		0.0028		10
DDD[22]	72-54-8	0.00083	0.00083		0.00083[10,16]		0.1
DDE[22]	72-55-9	0.00059	0.00059	0.1	0.00059[10,16]	0.1	0.1[14]
DDT[22]	50-29-3	0.00059	0.00059	0.1	0.000024	0.000024	0.1
Demeton	8065-48-3	0.1	0.1		0.1		1[14]
Di-N-Butyl Phthalate	84-74-2	2700	2700		2700[10,16]		10
Dibenzo(A,H)Anthracene (PAH)[11]	50-70-3	0.0028	0.0028		0.0028		10
Dibromochloromethane (HM)[15] *	124-48-1	6	6	14	6	14	1
Dichlorobenzene 1,2	95-50-1	620	620	620	620	620	1
Dichlorobenzene 1,3	541-73-1	400	400	620	400[10,16]	620	1
Dichlorobenzene 1,4[23]	106-37-6	75	75	75	75	75	1
Dichlorobenzidine	91-94-1	0.039	0.039		0.01	0.01	10
Dichloroethane 1,2*	107-06-2	0.4	0.4	0.4	0.4	0.4	1

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (μg/L)[1,2]
(continued)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment[5]	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
Dichloroethylene 1,1*	75-35-4	0.057	0.057	7	0.057[10,16]	7	1[14]
Dichloroethylene 1,2-CIS*	156-59-2	70	70	70	70	70	1
Dichloroethylene 1,2-TRANS*	156-60-5	100	100	100	100	100	1
Dichlorophenol 2,4	120-83-2	21	21	21	21	21	50
Dichlorophenoxyacetic Acid (2,4-D)	94-75-7	70	70	70	70	70	1
Dichloropropane 1,2*	78-87-5	0.56	0.56	0.56	0.56	0.56	1
Dichloropropylene 1,3*	542-75-6	10	10		10[10,16]		1
Dieldrin	60-57-1	0.00014	0.00014	0.002	0.000071	0.000071	0.1[14]
Diethyl Phthalate	84-66-2	23,000	23,000		23,000[10,16]		10
Dimethyl Phthalate	131-11-3	313,000	313,000		313,000[10,16]		10
Dimethylphenol 2,4	105-67-9	2120 (ac)	2120 (ac)		2120 (ac)[10]		50
Dinitro-O-Cresole 4,6	534-52-1	13	13		13[10,16]		50
Dinitrophenol 2,4	51-28-5	14	14	14	14	14	50
Dinitrotoluene 2,4	121-14-2	0.11	0.11		0.11[10,16]		10
Dinitrotoluene 2,6	606-20-2	230	230		230[10]		10
Dioxin (2,3,7,8 TCDD)	1746-01-6	0.000000013	0.000000013	0.00000022	0.000000013	0.000000013	0.01[24]
Diphenylhydrazine 1,2	122-66-7	0.04	0.04	0.05	0.04[10,16]	0.05	
Endosulfan	115-29-7	0.056	0.056		0.056		0.1[14]
Endosulfan Sulfate	1031-07-8	0.93	0.93		0.93[10,16]		0.1[14]
Endrin	72-20-8	0.0023	0.0023	0.2	0.0023	0.2	0.1[14]
Endrin Aldehyde	7421-93-4	0.2	0.2	0.2	0.2	0.2	0.1
Ethylbenzene*	100-41-4	680	680	680	680	680	1
Ethylhexyl Phthalate (BIS-2)	117-81-7	1.8	1.8		1.8[10,16]		10

148

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (μg/L)[1,2]
(continued)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment [5]	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
Fluoranthene (PAH)[11]	206-44-0	42	42		42		10
Fluorene (PAH)[11]	86-73-7	0.0028	0.0028		0.0028		10
Guthion	86-50-0	0.01	0.01		0.01		1.5
Halomethanes, Total[15]	---				0.19	0.19	1
Heptachlor[18]	76-44-8	0.00021	0.00021	0.008	0.00028	0.00028	0.1[14]
Heptachlor Epoxide	1024-57-3	0.0001	0.0001	0.09	0.0001[10,16]	0.09	0.05[14]
Hexachlorobenzene[12]	118-74-1	0.00072	0.00072	6	0.00072	0.00072	1
Hexachlorobutadiene[12]	87-68-3	0.45	0.45	1.0	0.45	0.45	1
Hexachlorocyclohexane, Alpha[18]	319-84-6	0.0039	0.0039	0.006	0.0092	0.0092	0.1[14]
Hexachlorocyclohexane, Beta[18]	319-85-7	0.014	0.014		0.0163	0.0163	0.1[14]
Hexachlorocyclohexane, Gamma (Lindane)[18]	58-89-9	0.019	0.019	0.2	0.0186	0.0186	0.1[14]
Hexachlorocyclohexane, Technical	608-73-1	0.012	0.012		0.0123	0.0123	0.5[14]
Hexachlorocyclopentadiene	77-47-4	5	5		5[10]		10
Hexachloroethane[12]	67-72-1	1.9	1.9		1.9	1.9	1
Ideno(1,2,3-cd)pyrene (PAH)[11]	193-39-5	0.0028	0.0028		0.0028		10
Isophorone	78-59-1	8.4	8.4	1050	8.4[10,16]	1050	10
Malathion	121-75-4	0.1	0.1		0.1		0.2[14]
Methoxychlor	72-43-5	0.03	0.03	40	0.03	40	0.5[14]
Methyl Bromide (HM)[15*]	74-83-9	48	48		48		1
Methyl Chloride (HM)[15*]	74-87-3	5.7	5.7		5.7		1
Methylene Chloride (HM)[15*]	75-09-2	4.7	4.7		4.7		1
Mirex	2385-85-5	0.001	0.001		0.001		0.1[14]
Monohydric Phenol[25]							

149

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (μg/L)[1,2]
(continued)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment[5]	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
N-Nitrosodi-N-Propylamine	621-64-7	0.005	0.005		0.005[10,18]		10
Napthalene (PAH)[11]	91-20-3	0.0028	0.0028		0.0028		10
Nitrobenzene	98-95-3	3.5	3.5	3.5	3.5	3.5	10
Nitrosodibutylamine N[12]	924-16-3	0.0064	0.0064		0.0064	0.0064	5
Nitrosodiethylamine N[12]	55-18-5	0.0008	0.0008		0.0008	0.0008	5
Nitrosodimethylamine N[12]	62-75-9	0.00069	0.00069		0.0014	0.0014	5
Nitrosodiphenylamine N[12]	86-30-6	4.9	4.9		4.9	4.9	10
Nitrosopyrrolidine N[12]	930-55-2	0.016	0.016		0.016	0.016	10
PAH[26]	—				0.0028	0.0028	1
Parathion[20]	56-38-2	0.4	0.4		0.4		
PCB's (Arochlor)	1336-36-3	0.000044	0.000044	0.005	0.000079	0.000079	1
Pentachlorobenzene	608-93-5	6	6	6	6	6	10
Pentachlorophenol	87-86-5	5.7	5.7	200	5.7[10]	200	50
Phenanthrene (PAH)[11]	85-01-8	0.0028	0.0028		0.0028		10
Phenol	108-95-2	2560	2560		1	1	50
Pyrene (PAH)[11]	129-00-0	0.0028	0.0028		0.0028		10
Simazine	122-34-9	4	4		4	4	1.0
Tetrachlorobenzene 1,2,4-5	95-94-3	2	2	2	2	2	10
Tetrachloroethane[25*]			76[16]				
Tetrachloroethane 1,1,2,2[12*]	79-34-5	0.17	0.17		0.17	0.17	1
Tetrachloroethylene[12]	127-18-4	0.8	0.8	5	0.8	0.8	1.0[14]
Toluene[*]	108-88-3	1000	1000	1000	1000	1000	1
Toxaphene	8001-35-2	0.0002	0.0002	0.03	0.0002	0.03[9]	5

150

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (μg/L)[1,2]
(continued)

Parameter[4]	CAS No.	Big Dry Segment 4[5]	Big Dry Segment[5]	Statewide Groundwater[6]	Quaternary and Rocky Flats Aquifers[7]	Arapahoe and Laramie-Fox Hills Aquifers[8]	Groundwater PQL[9]
Trichloroethane 1,1,1*	71-55-6	200	200	200	200	200	1
Trichloroethane 1,1,2[12*]	79-00-5	0.6	0.6	3	0.6	0.6	1.0[14]
Trichloroethylene[25*]	79-01-6	2.7	66[12]	5	2.7[10,16]	5[9]	1.0
Trichlorophenol 2,4,6[18]	88-06-2	2	2	2	1.2	1.2	1.0[14]
Trichlorophenoxyproprionic Acid (2,4,5-TP)	93-72-1	50	50	50	50	50	0.5[14]
Trihalomethanes, Total[15]	---						
Vinyl Chloride*	75-01-4	2	2	2	2	2	2

* Analytes routinely monitored under RFP *Ground Water Assessment Plan (GWAP).*

1 From WWE, 1993.
2 All standards are chronic unless noted otherwise.
3 In the absence of specific numeric standards for non-naturally occurring organics, the narrative standard "free from toxics", §3.1.11(1)(d), shall be interperted and applied in accordance with the provisions of §3.12.7(1)(c)(iv), so that the standard is interpreted consistently for surface and ground waters. (See footnote #9)
4 Parameters include all organics from Table 1 and Table 5, §3.12.7(1)(c), Table A, §3.11.5C.3, Table 1A and Table 3, §3.8.6, basin-wide tables, §3.8.5(2) and "Basic Standards for Organic Chemicals," §3.1.11(3).
5 The standards shown are derived from Table 1A and Table 3, §3.8.6. For organics not listed in §3.8.6, the "Basic Standards for Organic Chemicals", §3.1.11(3), apply. (See footnotes #9 and #10)
6 The standards shown are derived from Table A, §3.11.5C.3.
7 The standards shown are derived from Table 1 and Table 5, §3.12.7(1)(c). For organics not listed in §3.12.7(1)(c), the more stringent standard from either the statewide groundwater standards, §3.11.5C.3, or Big Dry Creek Segments 4 and 5 standards, Table 1A and Table 3, §3.8.6, and the "Basic Standards for Organic Chemicals", §3.1.11(3), is shown. Surface water standards for Big Dry Creek Segments 4 and 5 are applied to unconfined groundwater in the Rocky Flats Alluvium and Quaternary deposit because they are designated with a "surface water protection" classification.
8 The standards shown are derived from Table 1 and Table 5, §3.12.7(1)(c), and Table A, §3.11.5C.3.
9 The PQL's are detection levels based on the Colorado Department of Health laboratory's best judgment for Gas Chromatography/Mass Spectrophotometry (GC/MS) unless noted otherwise.
10 §3.12.7(1)(c)(iv) states if a "toxic substance for which no numerical standard has been established is found in a detectable amount", a consensus of specified parties will determine the appropriate standard. This table assumes that the most stringent surface water standard from Big Dry Creek Segments 4 and 5 will be applied to the unconfined groundwater in the Rocky Flats Alluvium and Quaternary deposits in practice. The WQCC has previously used the most stringent standard from the basic standards to develop Table 2A, 3.8.6.
11 The original site-specific standards provide one standard for all Polynuclear Aromatic Hydrocarbons (PAH). See 5 CCR 1002, §3.8.5 (93-90), Table 1. PAH is actually a group of chemicals. Thus, the standard for PAH §3.8.0, 5 CCR 1002-8, §3.1.0 (11-91), are adopted as site-specific standards from Table 1A, §3.8.6.
12 The standard for this parameter does not change, but the PQL differs from the GC detection limits listed in §3.8.5(2)(e).
13 High Pressure Liquid Chromatography (HPLC) PQL.

151

Table 3-9
Rocky Flats Groundwater Standards Comparison - Organics (µg/L)[1,2]
(continued)

[14] Gas Chromatography (GC) PQL.
[15] Total trihalomethanes are considered the sum of bromodichloromethane, dibromochloromethane, bromoform and chloroform. New statewide standards set limits for each of these four chemicals and deletes reference to either Halomethanes or Trihalomethanes. See Big Dry Creek Table 1A, footnote 7.
[16] WWE has elected to use the "Human Health Based, Water + Fish" standards from the "Basic Standards for Organic Chemicals", §3.1.11(3), for the Class 2 Aquatic Life classification of Big Dry Creek Segments 4 and 5. Although these standards technically only apply to Class 1 Aquatic Life classifications, the WQCC has previously used the most stringent standard from the basic standards to develop Table 1A, §3.8.6, without mention of the "Water +Fish" standards applying to Class 1 waters unless the WQCC specifically assigns these values to Class 2.
[17] From §3.8.0 "Classifications and Numeric Standards; South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin" Table 3; "Temporary Modifications, Big Dry Creek, Segment 5".
[18] Both the standard and the PQL change.
[19] §3.8.5 is deleted and the statewide standards for individual chemicals constituting PHA Table 1A, "Additional Organic Chemical Standards" shows "Chloromethyl Ether (BIS)", a carcinogen, but §3.12.7 for Rocky Flats groundwater shows "Chloroethyl Ether (BIS)". WWE assumes the name is "Chloromethyl Ether (BIS)" due to the insertion of "m" between the proposed and final rule in §3.8.5. "Chloroethyl Ether (BIS)" standard is shown as it appears in the regulations.
[20] There is no statewide organic chemical standard for this parameter.
[21] "Chlorophenol" is used in Table 1A for Big Dry Creek, the state standard for surface water uses "chlorophenol 2."
[22] "Aquatic Life" site-specific standard is 0.001 for DDT, which includes DDE and DDD.
[23] Dichlorobenzene 1,4, or para-Dichlorobenzene, is listed in 40 CFR 141.61 Part G as CAS No. 106-46-7, which appears to be correct.
[24] The dioxin PQL is retained from 5 CCR 1002-8, §3.8.5(e), Additional Organics Table.
[25] §3.8.36, page 139, details why these names are in error.
[26] The PAH standard is deleted in Table 1A for Big Dry Creek and replaced by standards for individual chemicals of the Polyaromatic Hydrocarbon (PAH) group.

significant strength to the existing regulatory scheme at RFP. Other aspects of the CWA reauthorization may address linkage between groundwater and surface water, wetlands, and discharges to groundwater.

A draft bill reauthorizing Superfund (i.e., CERCLA) is not expected to be introduced to Congress until late 1993 or early 1994 at the earliest (Cooper, 1993). Anticipated changes affecting groundwater under CERCLA would fall under the area of cleanup standards (also known as Applicable or Relevant and Appropriate Requirements [ARARs]), although it is premature to anticipate specific changes. Suggestions from industries affected by CERCLA include adoption of standardized (i.e., nationally applicable) cleanup standards and selection of less-stringent cleanup levels at sites where future land use will be minimal or restricted (Cooper, 1993; Duplancic, 1993; Roy, 1993).

Groundwater monitoring requirements under RCRA may be affected by finalization of two major regulations in the next one to two years. The first is the Hazardous Waste Identification Rule, which will revamp RCRA's definitions of what constitutes a hazardous waste with particular focus on the current "mixture rule," "derived from rule," and "contained-in" policy (Stults, 1993). Thus, groundwater containing hazardous waste at RFP may, in the future, no longer be considered a hazardous waste. The second is the Corrective Action Rule, which will detail requirements for sites under corrective action as a result of releases of hazardous wastes or constituents found in 58 FR 8658 (Federal Register [FR], 1993). In the past, EPA has tried to integrate RCRA and CERCLA cleanup requirements so that they complement, rather than contradict, each other. Thus, the Corrective Action Rule will likely parallel the Superfund reauthorization, with changes being made in both programs to make them more consistent.

DOE recently published a proposed rule under the regulations contained in 10 CFR Part 834. The proposed rule, found in 58 FR 16268 (FR, 1993), would require DOE facilities to assess all releases of radioactive material and all doses and potential doses to the public from DOE activities to ensure that they are managed in accordance with DOE's "as low as reasonably achievable" policy. It also provides requirements for the management of radioactive materials in liquid waste discharges, soil columns, and selected solid waste and requires sites to establish groundwater protection programs.

In December 1993, the CWQCC may hold a triennial review of the basic Standards for Groundwater (Section 3.12.0 of 5 CCR 1002-8) (CDH-CWQCC, 1991b). Several issues that are scheduled to be discussed at the rule-making hearing may affect RFP.

The revisions, as proposed by the Colorado Water Quality Control Division (CWQCD) to the Commission, include:

- An update of the organic standards tables
- Incorporation of new drinking water MCLs into the standards
- Possible promulgation of a groundwater standard for total petroleum hydrocarbons
- Additional pesticides added to the drinking water standards
- Relaxation of the present benzene standard (from 1 µg/L to 5 µg/L)

The CWQCC may hold a number of hearings in 1994 on major issues that could have implications for groundwater monitoring, including (1) removal of aquatic life standards for Segments 4 and 5 and (2) re-evaluation of statewide radionuclide standards in 1994 or promulgation of site-specific radionuclide standards in early 1995. In addition, state policy on groundwater administration and enforcement is constantly evolving and, therefore, must be monitored.

3.4.1 Addition to Organics Tables

The CWQCD is proposing to add 30 organic chemicals to Table A and four inorganic chemicals to Table 1 of the state groundwater standards. These modifications are prompted by EPA's promulgation of MCLs for these chemicals. The CWQCD will propose standards at the 10^{-6} health risk level or MCL level, depending on available information. A PQL will also be proposed for each parameter. In addition, members of the Commission have suggested that other additives to gasoline products (such as methanol and methyl-tertiary-butyl ether [MTBE]) be added to the statewide standards.

For many of the constituents, there is currently no RFP site-specific standard. These analytes should be added to the list of analytes monitored at RFP if standards are promulgated. For some constituents (e.g., simazine), an RFP site-specific standard already exists and would take precedence over statewide groundwater standards.

3.4.2 Discharges to Groundwater

The State Discharge Permit System to Groundwater (Section 6.15.0) of 5 CCR 1002-8 became effective July 1, 1993 (CDH-CWQCC, 1992). This regulation sets limits on surface discharges to groundwater and requires monitoring and possible compliance with groundwater standards for activities such as use of unlined impoundments for water treatment. The CWQCC currently is devising a plan to implement and enforce this regulation. If the A-, B-, and C-series ponds were still being regulated under the CWA, it is likely that this regulation would have impact on their operation. However, because regulation of the ponds under CERCLA is anticipated, the CWQCC regulations are not likely to have any impact.

3.4.3 Potentially Applicable Standards

Groundwater standards potentially applicable to RFP are provided in Tables 3-5 through 3-9 of this report. The range of potentially applicable groundwater standards at RFP include (1) statewide groundwater standards (2) site-specific groundwater standards (3) the narrative standard "no toxics in toxic amounts," also known as "free from toxics" (4) statewide surface water standards, and (5) site-specific surface water standards. There is a "hierarchy" among these alternative standards, as discussed below:

- If a groundwater standard for a given constituent is listed in the RFP site-specific regulation, then it is the prevailing standard. Some site-specific standards have been adopted for RFP.

- If there is no site-specific groundwater standard, then statewide groundwater standards apply. Statewide groundwater standards have been developed for the following groundwater classifications: (1) domestic use, (2) agricultural use, and (3) surface water quality protection. The most stringent statewide standards for the groundwater classifications at RFP (domestic, agricultural, and surface water protection) are shown in Tables 3-5 through 3-9.

- In Table 3-9, unconfined groundwater at RFP is divided into two categories to reflect the two groups of groundwater classification. At RFP, the unconfined groundwater in unconsolidated surficial deposits (Rocky Flats Alluvium, colluvium, valley-fill alluvium) has been classified as domestic use quality, agricultural use quality, and surface water quality protection. For the unconfined water in consolidated bedrock (Arapahoe and Laramie-Fox Hills) aquifers at RFP, groundwater classifications have been established as domestic use quality and agricultural use quality only. Because of written testimony prepared by DOE and EG&G prior to the January 1991 site-specific hearing, the CWQCC chose not to assign use classifications or numeric standards to the confined aquifers at RFP.

- Based on interviews with CWQCD staff in July 1993, for a constituent that has neither a site-specific nor a statewide groundwater standard, the "free from toxics" narrative standard is to be applied to unconfined groundwater that has a surface water quality protection classification. From a practical standpoint, when the "no toxics" narrative standard is applied by the CWQCD, CWQCD staff will quickly determine that the corresponding Big Dry Creek Segments 4 or 5 surface water standard should be applied (the location of these segments are shown in Figure 3-2). The surface water standards that apply to Segments 4 and 5 are extremely strict to ensure protection of water quality in Great Western Reservoir and Standley Lake. These standards were originally enacted by the CWQCC in February 1990, following the landmark December 1989 hearing on Woman Creek and Walnut Creek at the CWQCC. The surface water standards that apply to Segments 4 and 5 are based on various classifications, including water supply and fish ingestion, and are ultimately derived from *Basic Standards Applicable to Surface Waters of the State* (CDH-CWQCC, 1993). In addition, since groundwater is known to discharge at seeps, surface water standards could be imposed at these locations.

- For a toxic substance that has no numeric standard, Section 3.12.7(1)(c)(iv) of 5 CCR 1002-8 states that RFP will notify the CWQCD and EPA if the toxic substance is detected in groundwater at RFP. All three entities will then try to reach a consensus regarding a standard that will become the numeric protection level. If no consensus can be reached, the CWQCD will determine the numeric protection level. The entities will consider existing and potential beneficial uses in setting the numeric protection level, and this level will be applicable only in the specific area. The entities will then jointly petition the CWQCC for a rule-making hearing to set a numeric standard equal to the numeric protection level.

- When the current practical quantification limit (PQL) for a pollutant is less stringent than the corresponding numeric standard listed in the tables within the CWQCC regulations, the PQL is to be used as the performance standard (enforcement level) in regulating specific activities (5 CCR 1002-8 Section 3.11.5 C.4). PQLs for each constituent are identified in the attached tables, and they have been adopted directly from the regulations. The CWQCC has decided to rely on detection levels based on PQLs associated with gas chromatography-mass spectroscopy (GC-MS) laboratory analysis techniques except in instances where only a GC-based PQL exists. For those compounds that have a maximum contaminant level (MCL) as a standard, the corresponding detection method was adopted. The CWQCC has decided not to require detection to the generally more stringent GC-PQL in all circumstances, in order to temper the economic impact of the standards. As scientific knowledge and technology advance, this decision may be reconsidered. There has even been some discussion in CWQCC proceedings of developing site-specific PQLs in certain instances. In a few specific instances where national guidance is not available, PQLs have been established based on the professional judgment of CDH's laboratory personnel.

  An issue that frequently arises when discussing surface water and groundwater standards at RFP is the distinction among such terms as "practical quantitation level," "detection limit," "lower limit of detection," "method detection limit," and other such terms. The documentation submitted by DOE and EG&G for the January 1991 site-specific groundwater standards hearing discusses this subject as it applies at RFP.

- For groundwater classified "Domestic Use Quality" or "Agricultural Use — Quality," where a Table value is exceeded by the background level, the applicable standard for that parameter shall be either 1) the Table value or 2) the background level for that parameter (5 CCR 1002-8 Section 3.11.5). This determination shall be made considering the increased risk to public health, crops, or livestock associated with the background levels, the extent of the exceedance above the Table value, the degree to which the pollution is deemed correctable and subject to treatment; and the economic reasonableness of such treatment requirements.

158

158

4. RECOMMENDATIONS FOR GROUNDWATER MONITORING AT RFP

The purpose of a groundwater monitoring program is to fulfill technically based programmatic objectives and to satisfy regulatory requirements. The review of regulatory requirements and geological, hydrologic, and geochemical data a indicate that regulatory monitoring requirements and sitewide programmatic objectives are generally being met. However, modifications can be made to improve sitewide monitoring at RFP. The following sections present recommendations for the design of a coherent sitewide groundwater monitoring program at RFP based on the technical and regulatory objectives discussed in Sections 2.0 and 3.0. Section 4.1 presents recommendations for periodic measurement of the elevation of the groundwater potentiometric surface to characterize the groundwater flow regime. Section 4.2 presents the proposed network to monitor groundwater quality. A two-component monitoring network is recommended and the rationale for these networks is included. Section 4.3 recommends a framework for selecting an analytical suite for groundwater monitoring that is appropriate to the intended data use in each of the networks. Section 4.4 presents recommendations for a point-of-compliance for RFP. Section 4.5 presents recommendations for additional characterization and data evaluation activities.

4.1 Groundwater Flow System Monitoring

The purpose of routinely monitoring the groundwater flow system is to characterize flow direction, flow velocities, and hydraulic gradients, evaluate seasonal and long-term temporal trends, and identify any significant change to the flow regime that may result from unusual activities or events. Flow system monitoring should be performed quarterly and, in some cases, monthly.

4.1.1 Quarterly Monitoring of Groundwater Flow System

All existing and newly installed monitoring wells at RFP should be monitored quarterly to determine the elevation of the potentiometric surface. Obviously, wells that are damaged, screened across multiple hydrostratigraphic units, or otherwise do not provide useable data should not be measured.

4.1.2 *Monthly Monitoring of the Groundwater Flow System*

Recommendations in this section are based on the *Monthly Water Level Measurement Well Section Report* (EG&G, 1993e). Monitoring of water-level elevations in selected wells at RFP is performed to fulfill the following objectives:

- Performance monitoring of IM/IRAs, including the groundwater intercept system at OU1 and the soil vapor extraction system OU2
- Definition of water-level fluctuations at the plant boundaries to assist in performing a water balance for the site
- Hydrogeologic characterization of groundwater/surface water interaction in drainages
- Hydrogeologic characterization of vertical hydraulic gradients between surficial deposits and bedrock
- Hydrogeologic characterization of hydraulic gradients in the industrial area and vicinity

Based on an evaluation of the location and number of wells and the usability of water-level data obtained, a proposed monthly water-level measurement network consisting of 95 wells is presented in Table 4-1. This table identifies the purpose for the wells proposed for the network. In addition, Table 4-1 presents the reason for eliminating wells currently being measured monthly for water levels as of June 1993. Wells were eliminated from the network because they were either abandoned, were considered dry according to Standard Operating Procedures (SOP) GW.01 - Water Level Measurements in Wells and Piezometers (EG&G, 1992c), were slow to recover after sampling (making a subsequent measurement unusable), were screened across two hydrostratigraphic units, or were screened across large intervals. In order to stop collection of redundant data, wells were also eliminated from the network if they were in proximity to other wells. As indicated in Table 4-1, wells were added to the network to provide better hydrogeologic characterization and performance monitoring of the IM/IRAs.

Table 4-1
Proposed Monthly Water Level Monitoring Network

Well ID	Screened Unit	Monthly Measurements (as of June 1993)	Proposed Monthly Measurements	Purpose or Reason For Elimination From The Monthly Water Level Monitoring Program
0186	Alluvium	X	X	Hydrogeologic characterization at plant boundary
0386	Bedrock	X		Eliminated due to poor hydraulic response
0486	Alluvium	X		Well abandoned
1086	Alluvium	X		Data provided by other nearby wells
1386	Alluvium	X	X	Hydrogeologic characterization of drainages
1786	Alluvium	X		Data provided by other nearby wells
1886	Alluvium	X	X	Hydrogeologic characterization of drainages
1986	Alluvium	X	X	Hydrogeologic characterization within RFP
2486	Alluvium	X		Data provided by other nearby wells
2686	Alluvium	X		Data provided by other nearby wells
2886	Alluvium	X		Well abandoned
2986	Alluvium	X		Data provided by other nearby wells
3586	Alluvium	X		Data provided by other nearby wells
3686	Alluvium	X	X	Hydrogeologic characterization of drainages
3786	Alluvium		X	Hydrogeologic characterization of drainages
4186	Alluvium	X		Data provided by other nearby wells
4286	Alluvium	X	X	Hydrogeologic characterization within RFP, characterization of vertical gradient between alluvium / bedrock
4386	Alluvium	X	X	Hydrogeologic characterization within RFP
4486	Alluvium	X		Data provided by other nearby wells
4586	Alluvium	X		Well abandoned
4786	Alluvium	X		Well construction (i.e. long well screen) results in unuseful water-level data
5086	Alluvium	X		Well construction (i.e. long well screen) results in unuseful water-level data
5186	Alluvium	X		Well construction (i.e. long well screen) results in unuseful water-level data
5386	Alluvium	X		Data provided by other nearby wells
5486	Bedrock	X	X	Assess vertical gradient
5586	Alluvium	X	X	Assess vertical gradient
5686	Alluvium		X	Hydrogeologic characterization of drainages
5886	Alluvium		X	Hydrogeologic characterization of drainages
6186	Alluvium	X		Data provided by other nearby wells
6386	Alluvium	X		Data provided by other nearby wells
6486	Alluvium		X	Hydrogeologic characterization of drainages
6586	Alluvium		X	Hydrogeologic characterization of drainages
6686	Alluvium	X	X	Hydrogeologic characterization of drainages
7086	Alluvium		X	Hydrogeologic characterization of drainages
0487	Alluvium	X		Data provided by other nearby wells
1087	Alluvium	X	X	Hydrogeologic characterization within RFP
1587	Alluvium	X	X	Hydrogeologic characterization within RFP
1787	Alluvium	X		Well abandoned
1887	Bedrock		X	characterization of vertical gradient between alluvium / bedrock
2487	Alluvium	X	X	Hydrogeologic characterization within RFP/ performance evaluation of Soil Vapor Extraction System
2587	Bedrock		X	Performance evaluation of Soil Vapor Extraction System

\25030814-1.XLS 4/29/94 2:50 PM

161

Table 4-1
Proposed Monthly Water Level Monitoring Network

Well ID	Screened Unit	Monthly Measurements (as of June 1993)	Proposed Monthly Measurements	Purpose or Reason For Elimination From The Monthly Water Level Monitoring Program
2687	Alluvium	X	X	Hydrogeologic characterization within RFP
2887	Bedrock	X		Eliminated due to poor hydraulic response
3187	Bedrock	X		Eliminated due to poor hydraulic response
3287	Alluvium	X		Data provided by other nearby wells
3387	Alluvium	X	X	Hydrogeologic characterization within RFP
3587	Alluvium	X		Data provided by other nearby wells
3687	Bedrock	X	X	Provides data for No.1 Sandstone at OU2
3787	Alluvium	X		Well abandoned
4087	Alluvium	X	X	Hydrogeologic characterization within RFP
4287	Alluvium	X		Eliminated due to poor hydraulic response
4387	Alluvium	X		Data provided by other nearby wells
4487	Alluvium	X		Data provided by other nearby wells
4787	Alluvium	X		Data provided by other nearby wells
5487	Alluvium	X		Data provided by other nearby wells
5587	Alluvium	X	X	Hydrogeologic characterization of drainages
5687	Alluvium	X	X	Hydrogeologic characterization within RFP
6387	Alluvium	X		Well abandoned
6487	Alluvium	X		Data provided by other nearby wells
6787	Alluvium	X		Well abandoned
7087	Alluvium	X		Data provided by other nearby wells
B 102289	Alluvium	X	X	Hydrogeologic characterization within RFP
B 106089	Alluvium	X	X	Hydrogeologic characterization within RFP
B 110989	Alluvium	X		Data provided by other nearby wells
B 111189	Alluvium	X		Data provided by other nearby wells
P 114389	Alluvium	X	X	Hydrogeologic characterization of drainages
P 114489	Alluvium	X		Data provided by other nearby wells
P 114589	Alluvium	X		Data provided by other nearby wells
P 114689	Alluvium	X	X	Hydrogeologic characterization within RFP
P 114789	Alluvium	X		Data provided by other nearby wells
P 114889	Alluvium	X		Data provided by other nearby wells
P 114989	Alluvium	X		Data provided by other nearby wells
P 115089	Alluvium	X	X	Hydrogeologic characterization within RFP
P 115489	Alluvium	X		Data provided by other nearby wells
P 115589	Alluvium	X		Data provided by other nearby wells
P 115689	Alluvium	X	X	Hydrogeologic characterization within RFP
P 119389	Alluvium	X		Data provided by other nearby wells
B 200589	Alluvium	X	X	Hydrogeologic characterization within RFP
B 200889	Alluvium	X	X	Hydrogeologic characterization within RFP, characterization of vertical gradient between alluvium / bedrock
B 201089	Alluvium	X	X	Hydrogeologic characterization within RFP
B 201289	Alluvium	X	X	Hydrogeologic characterization at plant boundary
B 202489	Alluvium	X		Data provided by other nearby wells

\250308t4-1.XLS 4/29/94 2:50 PM

162

Table 4-1
Proposed Monthly Water Level Monitoring Network

Well ID	Screened Unit	Monthly Measurements (as of June 1993)	Proposed Monthly Measurements	Purpose or Reason For Elimination From The Monthly Water Level Monitoring Program
B 203189	Bedrock	X	X	
B 203589	Bedrock		X	Characterization of vertical gradient between alluvium / bedrock
B 203889	Bedrock	X	X	Characterization of vertical gradient between alluvium / bedrock
B 208089	Alluvium	X		Data provided by other nearby wells
B 208789	Alluvium	X	X	Hydrogeologic characterization of drainages
P 209289	Alluvium	X		Data provided by other nearby wells
P 209989	Alluvium	X		Well abandoned
B 210489	Alluvium	X	X	Hydrogeologic characterization of drainages
P 213689	Alluvium	X		Data provided by other nearby wells
B 213789	Alluvium	X		Data provided by other nearby wells
P 213889	Bedrock	X		Eliminated due to poor hydraulic response
P 213989	Alluvium	X	X	Hydrogeologic characterization within RFP
P 215789	Alluvium	X		Data provided by other nearby wells
B 217289	Bedrock	X		Eliminated due to poor hydraulic response
P 218389	Alluvium	X	X	Hydrogeologic characterization within RFP
B 218789	Alluvium	X	X	Hydrogeologic characterization within RFP
P 219189	Alluvium	X	X	Hydrogeologic characterization within RFP
P 219489	Alluvium	X		Data provided by other nearby wells
P 219589	Alluvium	X		Data provided by other nearby wells
B 302889	Alluvium		X	Assess vertical gradient
B 302989	Alluvium	X	X	Hydrogeologic characterization within RFP
B 304889	Bedrock		X	Assess vertical gradient
B 304989	Bedrock		X	Assess vertical gradient
P 313489	Alluvium	X		Data provided by other nearby wells
P 313589	Alluvium	X	X	Hydrogeologic characterization within RFP
P 314089	Alluvium	X		Data provided by other nearby wells
P 314289	Alluvium	X		Data provided by other nearby wells
B 317189	Bedrock	X		Dry
B 400389	Alluvium		X	Hydrogeologic characterization at plant boundary
B 401989	Alluvium		X	Hydrogeologic characterization within RFP
B 410589	Alluvium		X	Hydrogeologic characterization within RFP
B 410689	Alluvium	X		Data provided by other nearby wells
B 410789	Alluvium	X		Data provided by other nearby wells
B 411289	Alluvium		X	Hydrogeologic characterization at plant boundary
B 411389	Alluvium	X		Data provided by other nearby wells
P 414189	Alluvium	X	X	Hydrogeologic characterization within RFP
P 415889	Alluvium	X	X	Hydrogeologic characterization within RFP
P 415989	Alluvium	X		Data provided by other nearby wells
P 416089	Alluvium	X		Data provided by other nearby wells
P 416189	Alluvium	X		Data provided by other nearby wells
P 416289	Alluvium	X	X	Hydrogeologic characterization within RFP

163

Table 4-1
Proposed Monthly Water Level Monitoring Network

Well ID	Screened Unit	Monthly Measurements (as of June 1993)	Proposed Monthly Measurements	Purpose or Reason For Elimination From The Monthly Water Level Monitoring Program
P 416489	Alluvium	X	X	Hydrogeologic characterization within RFP
P 416489	Alluvium	X		Data provided by other nearby wells
P 416589	Alluvium	X		Data provided by other nearby wells
P 416689	Alluvium	X		Data provided by other nearby wells
P 416789	Alluvium	X		Data provided by other nearby wells
P 416889	Alluvium	X	X	Hydrogeologic characterization within RFP
P 419689	Alluvium	X		Data provided by other nearby wells
00390	Alluvium		X	Hydrogeologic characterization within RFP
00990	Alluvium		X	Hydrogeologic characterization within RFP
00791	Alluvium	X		Dry
00891	Alluvium	X		Dry
00991	Bedrock	X		Eliminated due to poor hydraulic response
01291	Alluvium	X		Data provided by other nearby wells
02191	Alluvium	X		Dry
02291	Bedrock		X	Performance evaluation of Soil Vapor Extraction System
02391	Alluvium	X		Dry
02791	Alluvium	X		Dry
02991	*		X	Performance evaluation of Soil Vapor Extraction System
03391	Bedrock		X	Performance evaluation of Soil Vapor Extraction System
03891	Alluvium	X		Dry
04091	Alluvium		X	Hydrogeologic characterization within RFP
04891	Alluvium	X		Dry
05291	Alluvium	X	X	Hydrogeologic characterization within RFP
05991	Alluvium	X		Dry
06291	Alluvium		X	Hydrogeologic characterization within RFP
07891	Alluvium		X	Performance evaluation of Soil Vapor Extraction System
08291	Alluvium	X		Dry
08491	Alluvium	X		Dry
11291	Alluvium	X		Dry
11891	Bedrock		X	Performance evaluation of Soil Vapor Extraction System
12191	Bedrock		X	Performance evaluation of Soil Vapor Extraction System
12391	Bedrock		X	Hydrogeologic characterization within RFP
12891	Alluvium	X		Dry
13391	Alluvium		X	Hydrogeologic characterization within RFP
20491	Alluvium		X	Hydrogeologic characterization within RFP
20691	Alluvium		X	Hydrogeologic characterization within RFP, characterization of vertical gradient between alluvium / bedrock
20791	Bedrock		X	characterization of vertical gradient between alluvium / bedrock
33691	Alluvium	X		Dry
34591	Alluvium	X		Dry
35991	Alluvium	X		Dry
38191	Alluvium	X		Data provided by other nearby wells

\250308\sec4.doc

\250308\4-1.XLS 4/29/94 2:50 PM

164

Table 4-1
Proposed Monthly Water Level Monitoring Network

Well ID	Screened Unit	Monthly Measurements (as of June 1993)	Proposed Monthly Measurements	Purpose or Reason For Elimination From The Monthly Water Level Monitoring Program
38291	Alluvium	X		Data provided by other nearby wells
38891	Alluvium	X		Data provided by other nearby wells
38991	Bedrock	X	X	
39291	Bedrock	X		Eliminated due to poor hydraulic response
39991	Alluvium	X		Well abandoned
40491	Alluvium	X		Dry
40791	Alluvium	X		Dry
40991	Bedrock	X		Well construction (i.e. screened across bedrock contact) results in unuseful water-level data
41091	Alluvium		X	Hydrogeologic characterization of drainages
41591	Alluvium		X	Hydrogeologic characterization at plant boundary
45191	Alluvium		X	Hydrogeologic characterization at plant boundary
45391	Alluvium	X		Data provided by other nearby wells
10092	Alluvium	X	X	Hydrogeologic characterization within RFP
10192	Alluvium	X	X	Performance evaluation of OU1 french drain
10292	Bedrock	X	X	Performance evaluation of OU1 french drain
10392	Alluvium	X	X	Performance evaluation of OU1 french drain
10492	Bedrock	X	X	Performance evaluation of OU1 french drain
10592	Alluvium	X	X	Performance evaluation of OU1 french drain
10692	Alluvium	X	X	Performance evaluation of OU1 french drain
10792	Bedrock		X	Performance evaluation of OU1 french drain
10892	Bedrock	X	X	Performance evaluation of OU1 french drain
10992	Alluvium	X	X	Performance evaluation of OU1 french drain
11092	Alluvium	X	X	Performance evaluation of OU1 french drain
46692	Bedrock	X	X	characterization of vertical gradient between alluvium / bedrock
46792	Bedrock	X	X	characterization of vertical gradient between alluvium / bedrock
46892	Bedrock	X	X	characterization of vertical gradient between alluvium / bedrock
23293	*		X	Performance evaluation of Soil Vapor Extraction System

* Well Construction Log Not Available

\25030814-1 XLS 4/29/94 2 50 PM

165

4.2 Proposed Groundwater Quality Monitoring Networks

The purpose of routine monitoring of groundwater quality is to meet regulatory requirements and fulfill technical objectives, including determining the presence or absence and nature and extent of contamination. Although technical and regulatory objectives of a groundwater quality monitoring network are generally similar, the actual number and locations of wells, frequency of sampling, and analytical suites needed to satisfy these objectives are not necessarily identical. As a result, this report recommends a two-component program consisting of a technically based Semiannual Monitoring Network and a regulatory-based Quarterly Monitoring Network to meet both types of objectives. All wells known exist as of June 1993 were evaluated for inclusion in the proposed semi-annual or quarterly groundwater monitoring program. The wells proposed for the Semiannual Monitoring Network are listed in Table 4-2 and shown in Plate 4-1. The wells proposed for the Quarterly Monitoring Network are listed in Table 4-3 and shown in Plate 4-2. The 114 active wells at RFP not included in either program were recommended for elimination from the sampling program (Table 4-4). Table 4-4 does not include wells listed as inactive as of June, 1993.

4.2.1 Semiannual Monitoring Network

The proposed Semiannual Monitoring Network comprises a total of 300 wells. This network includes 142 existing wells that only will be sampled semiannually and all 158 existing wells in the proposed Quarterly Monitoring Network discussed below. The proposed Semiannual Monitoring Network fulfills, from a technical perspective, the programmatic monitoring goals of suitably placed wells with respect to know sources of contamination, early detection of releases, ability to intercept/monitor predicted migration pathways, ability to delineate nature and extent of contamination, and ability to quantify contaminants migration rates and temporal trends in contaminant concentrations. Design of the network is based on the conceptual model for groundwater flow that was developed in Section 2. The conceptual model is based on an assessment of geological, hydrogeological, and chemical data, the concentrations and spacial distributions of contaminants in groundwater, and an evaluation of the likely contaminant migration pathways. Selection of the 142 wells proposed for only semiannual monitoring was made using the process described in the following section.

166

166

Table 4-2

Wells Recommended For Semiannual Sampling And Analysis[1]

Well ID	Proposed Well Classification	Proposed Well Purpose	Unit or Lithology Screened[2]
0586	Plant Protection	Plume Definition - No Name Gulch	Qc?
0686	Plant Protection	Plume Definition - No Name Gulch	Qc
3786	Plant Protection	Plume Definition - South Walnut Creek	Qc
3886	Plant Protection	Plume Definition - South Walnut Creek	Qa
3986	Plant Protection	Plume Definition - East of 903 Pad & East Trenches	Qrf
4086	Plant Protection	Plume Definition - East Trenches	Kclst
4286	Plant Protection	Source Characterization - East Trenches	Qrf
4386	Plant Protection	Source Characterization - Mound Area	Qrf
4486	Plant Protection	Source Characterization - Industrial Area	Qrf
5386	Plant Protection	Baseline Monitoring - upgradient (western) boundary	Qrf
6286	Plant Protection	Plume Definition - South Interceptor Ditch	Ksltss & Kcss
6386	Plant Protection	Plume Definition - South Interceptor Ditch	Qc
6486	Plant Protection	Plume Definition - Woman Creek	Qa
6586	Plant Protection	Plume Definition - Woman Creek	Qa
6686	Plant Protection	Plume Definition - Woman Creek	Qa
6886	Plant Protection	Plume Definition - Woman Creek	Qc?
7086	Plant Protection	Plume Definition - Woman Creek	Qc?
0187	Plant Protection	Source Characterization - 881 Hillside	fill
0487	Plant Protection	Source Characterization - 881 Hillside	Qc
0987	Plant Protection	Source Characterization - 903 Pad Area	Kss
1187	Plant Protection	Plume Definition - 903 Pad Area	Kcss
1487	Plant Protection	Plume Definition - 903 Pad Area	Kss & Kslt
1587	Plant Protection	Source Characterization - 903 Pad Area	Qrf
1687	Plant Protection	Source Characterization - 903 Pad Area	Kslt
1887	Plant Protection	Source Characterization - Mound Area	Kss & Ksslt
2587	Plant Protection	Source Characterization - East Trenches	Ksltss & Kss
2687	Plant Protection	Plume Definition - East Trenches	Qrf
2887	Plant Protection	Source Characterization - East Trenches	Kslt & Kclst
2987	Plant Protection	Plume Definition - South Interceptor Ditch	Qc
3087	Plant Protection	Plume Definition - South Interceptor Ditch	Kcslt
3187	Plant Protection	Plume Definition - East Trenches	Ksltclst
3387	Plant Protection	Source Characterization - East Trenches	Qrf
3487	Plant Protection	Source Characterization - East Trenches	Ksltclst & Kslt
3687	Plant Protection	Source Characterization - East Trenches	Kss & Kslt & Kclst
4387	Plant Protection	Source Characterization - 881 Hillside	Qc

\250308\4-2.XLS 4/29/94 2:55 PM

161

Table 4-2

Wells Recommended For Semiannual Sampling And Analysis[1]

Well ID	Proposed Well Classification	Proposed Well Purpose	Unit or Lithology Screened[2]
4587	Plant Protection	Plume Definition - Mound Area	Kss & Kslt & Kclst
5187	Plant Protection	Source Characterization - 881 Hillside	fill?
5287	Plant Protection	Source Characterization - 881 Hillside	fill?
5587	Plant Protection	Plume Definition - Woman Creek	Qc
B 102289	Plant Protection	Baseline Monitoring - Future Landfill area	Qc?
B 200589	Plant Protection	Baseline Monitoring - groundwater divide in North Buffer Zone	Qrf
B 200889	Plant Protection	Baseline Monitoring - groundwater divide in North Buffer Zone	Qrf
B 201189	Plant Protection	Plume Definition - North Boundary	Qc
B 202489	Plant Protection	Baseline Monitoring - Rock Creek Drainage	Qc
B 202589	Plant Protection	Baseline Monitoring - Rock Creek Drainage	Qc
B 203189	Plant Protection	Baseline Monitoring - groundwater divide in North Buffer Zone	Kclst & Ksclst
B 203589	Plant Protection	Baseline Monitoring - groundwater divide in North Buffer Zone	Qrf & Ksclst & Kclst
B 203889	Plant Protection	Baseline Monitoring - groundwater divide in North Buffer Zone	Kclst
B 204089	Plant Protection	Baseline Monitoring - McKay Ditch	Ksltss
B 205589	Plant Protection	Plume Definition - North Boundary	Qc
B 217289	Plant Protection	Plume Definition - East Boundary	Kss & Ksltss & Kclstst
P 218089	Plant Protection	Source Characterization - Industrial Area	Qrf
P 219089	Plant Protection	Source Characterization - Solar Evaporation Ponds (currently inactive)	Qc & Kclst & Ksltclst
B 302089	Plant Protection	Plume Definition - Woman Creek	Qc
B 302789	Plant Protection	Plume Definition - South Buffer Zone	Qc
B 302889	Plant Protection	Plume Definition - South Buffer Zone	Qc
B 303089	Plant Protection	Plume Definition - East Boundary	Kclst
B 304889	Plant Protection	Plume Definition - South Buffer Zone	Kclst
B 304989	Plant Protection	Plume Definition - South Buffer Zone	Ksltss & Ksslt
P 317989	Plant Protection	Plume Definition - 881 Hillside	Qrf
B 400189	Plant Protection	Baseline Monitoring - upgradient (western) boundary	Qrf
B 400489	Plant Protection	Baseline Monitoring - upgradient (western) boundary	Qrf
B 402189	Plant Protection	Baseline Monitoring - South Buffer Zone	Qc?
B 402689	Plant Protection	Baseline Monitoring - upgradient (western) boundary	Qc?
B 405389	Plant Protection	Baseline Monitoring - South Buffer Zone	Ksltclst & Kcslt
B 405889	Plant Protection	Baseline Monitoring - South Buffer Zone	Kss
B 405989	Plant Protection	Baseline Monitoring - South Buffer Zone	Qc
00191	Plant Protection	Source Characterization - 903 Pad Area	Qrf
00291	Plant Protection	Source Characterization - 903 Pad Area	Kclss & Ksclst
00391	Plant Protection	Plume Definition - 903 Pad Area	Ksclst & Kcss

\250308\4-2.XLS 4/29/94 2:55 PM

168

Table 4-2

Wells Recommended For Semiannual Sampling And Analysis[1]

Well ID	Proposed Well Classification	Proposed Well Purpose	Unit or Lithology Screened[2]
00491	Plant Protection	Plume Definition - 903 Pad Area	Kclst
01291	Plant Protection	Plume Definition - 903 Pad Area	Qc
01391	Plant Protection	Plume Definition - 903 Pad Area	Qrf
01491	Plant Protection	Source Characterization - 903 Pad Area	Kss & Kcs
01791	Plant Protection	Source Characterization - 903 Pad Area	Ksltss & Ksclst
01891	Plant Protection	Source Characterization - 903 Pad Area	Ksltss & Ksltclst
02091	Plant Protection	Source Characterization - 903 Pad Area	Ksclst & Ksslt & Ksltclst
02191	Plant Protection	Source Characterization - 903 Pad Area	Qrf
02291	Plant Protection	Source Characterization - 903 Pad Area	Ksclst & Kclss
02391	Plant Protection	Source Characterization - 903 Pad Area	Qrf
02491	Plant Protection	Source Characterization - 903 Pad Area	Ksltss & Ksslt & Kironstn
02591	Plant Protection	Plume Definition - East Trenches	Kclss & Ksclst
02691	Plant Protection	Plume Definition - Solar Evaporation Ponds	Ksltss & Ksltclst
03091	Plant Protection	Source Characterization - East Trenches	Ksltss & Kss & Ksclst
03391	Plant Protection	Source Characterization - East Trenches	Kss, Ksltss, & Ksclst
03591	Plant Protection	Source Characterization - East Trenches	Qrf
03691	Plant Protection	Plume Definition - East Trenches	Kss & Kclss
03791	Plant Protection	Plume Definition - East Trenches	Kss & Ksclst & Ksltss
03991	Plant Protection	Plume Definition - East Trenches	Qrf
04091	Plant Protection	Plume Definition - East Trenches	Qrf
04191	Plant Protection	Source Characterization - East Trenches	Qrf
04291	Plant Protection	Source Characterization - East Trenches	Ksclst
04491	Plant Protection	Source Characterization - East Trenches	Qrf
04591	Plant Protection	Source Characterization - East Trenches	Qrf
04691	Plant Protection	Plume Definition - East Trenches	Qrf
04991	Plant Protection	Plume Definition - East Trenches	Qrf
05091	Plant Protection	Plume Definition - East Trenches	Qrf
05191	Plant Protection	Plume Definition - East Trenches	Qrf
05291	Plant Protection	Plume Definition - East Trenches	Qrf
05391	Plant Protection	Plume Definition - East Trenches	Qrf
05991	Plant Protection	Plume Definition - 903 Pad Area	Qc
06091	Plant Protection	Plume Definition - East Trenches	Qrf
06191	Plant Protection	Plume Definition - East Trenches	Qrf
06391	Plant Protection	Plume Definition - East Trenches	Qrf
06591	Plant Protection	Source Characterization - 903 Pad Area	Ksclst & Ksltclst

\250308\4-2.XLS 4/29/94 2:55 PM

169

Table 4-2

Wells Recommended For Semiannual Sampling And Analysis[1]

Well ID	Proposed Well Classification	Proposed Well Purpose	Unit or Lithology Screened[2]
06791	Plant Protection	Source Characterization - 903 Pad Area	Qrf
07891	Plant Protection	Source Characterization - East Trenches	Qrf
07991	Plant Protection	Source Characterization - East Trenches	Qrf
08391	Plant Protection	Source Characterization - East Trenches	Qrf
08891	Plant Protection	Source Characterization - 903 Pad Area	Qrf
09091	Plant Protection	Source Characterization - 903 Pad Area	Qrf
09691	Plant Protection	Plume Definition - 903 Pad Area	Ksltss & Kclst
10991	Plant Protection	Plume Definition - East Trenches	Ksltss
11691	Plant Protection	Source Characterization - East Trenches	Kclss & Kss
11791	Plant Protection	Plume Definition - 903 Pad Area	Ksclst
11891	Plant Protection	Source Characterization - East Trenches	Ksslt & ksltss
12091	Plant Protection	Source Characterization - 903 Pad Area	Ksltss
12191	Plant Protection	Source Characterization - East Trenches	Ksltss & Kss
12391	Plant Protection	Plume Definition - East Trenches	Kss & Ksltss & Kclss
12991	Plant Protection	Source Characterization - 903 Pad Area	Ksclst
13191	Plant Protection	Source Characterization - 903 Pad Area	Ksclst
13291	Plant Protection	Source Characterization - 903 Pad Area	Qrf
13391	Plant Protection	Plume Definition - East Trenches	Qrf
13491	Plant Protection	Source Characterization - East Trenches	Qrf
30991	Plant Protection	Plume Definition - Woman Creek	Qc
34791	Plant Protection	Plume Definition - 903 Pad Area	Qc
35691	Plant Protection	Source Characterization - 881 Hillside	Qc
36191	Plant Protection	Source Characterization - 881 Hillside	Qc
37591	Plant Protection	Plume Definition - 881 Hillside	Qrf
37691	Plant Protection	Plume Definition - Mound Area	Qrf
37791	Plant Protection	Source Characterization - 881 Hillside	Qrf
37891	Plant Protection	Source Characterization - 881 Hillside	Kclsltst &Ksltst
37991	Plant Protection	Source Characterization - 881 Hillside	Kclsltst & Kssltst
38591	Plant Protection	Plume Definition - Woman Creek	Qc
39691	Plant Protection	Source Characterization - 881 Hillside	Qrf & Kclst
40991	Plant Protection	Plume Definition - North Walnut Creek	Qc & Kclst
41091	Plant Protection	Plume Definition - North Walnut Creek	Qa
46392	Plant Protection	Baseline Monitoring - east of West Spray Field	Kclst
46492	Plant Protection	Baseline Monitoring/Plume Definition - west of Industrial Area	Qrf
46692	Plant Protection	Source Characterization - East Trenches	Ksltss, Ksslt, &Kclst

~~170~~

1.70

Table 4-2

Wells Recommended For Semiannual Sampling And Analysis[1]

Well ID	Proposed Well Classification	Proposed Well Purpose	Unit or Lithology Screened[2]
46792	Plant Protection	Source Characterization - East Trenches	Ksslt, Kcslt, & Kslt
46892	Plant Protection	Source Characterization - East Trenches	Ksltss, Ksslt, & Kclst

1 Selected from wells known to exist as of June, 1993.

2 Kss = Cretaceous sandstone
Kclst = Cretaceous claystone
Kcslt = Cretaceous clayey siltstone
Kcss = Cretaceous clayey sandstone
Ksclst = Cretaceous sandy claystone
Kslt = Cretaceous siltstone
Ksltclst = Cretaceous silty claystone
Ksltss = Cretaceous silty sandstone
Ksslt = Cretaceous sandy siltstone
Qa = Quaternary alluvium
Qc = Quaternary colluvium
Qrf = Quaternary Rocky Flats alluvium

\250308\4-2.XLS 4/29/94 2:55 PM

171

Table 4-3

Wells Recommended For Quarterly Sampling And Analysis[1]

Well ID	Proposed Well Classification[2]	Well Purpose	Unit or Lithology Screened[3]
0186	Boundary -AIP	to monitor east boundary alluvial groundwater in Woman Creek drainage	Qa
0386	Boundary -AIP	to monitor east boundary bedrock groundwater in 1st drainage north of Central Ave.	Kss
0786	RCRA-C	to monitor alluvial groundwater downgradient (east) of Present Landfill	Qc
0886	RCRA-C	to monitor bedrock groundwater downgradient (east) of Present Landfill	Ksslt
0986	RCRA-S	to monitor bedrock groundwater upgradient (west) of Present Landfill	Kss / Ksslt
1086	RCRA-S	to monitor alluvial groundwater upgradient (west) of Present Landfill	Qrf
1386	RCRA-C	to monitor alluvial groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek Drainage)	Qc
1486	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek Drainage)	Kss / Ksclst
1586	RCRA-C	to monitor alluvial groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek Drainage)	Qc
1686	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek Drainage)	Ksltss
1786	RCRA-C	to monitor alluvial groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek)	Qc
1986	CERCLA	characterization for Industrial Area IM/IRA	Kclst
2186	CERCLA	characterization for Industrial Area IM/IRA	Kss / Ksltclst
2286	RCRA-C	to monitor alluvial groundwater at Solar Evaporation Ponds	Qrf
2386	RCRA-C	to monitor bedrock groundwater upgradient (southwest) of Solar Evaporation Ponds	Kslt / Ksltclst
2586	RCRA-C	to monitor bedrock groundwater at Solar Evaporation Ponds	Ksltclst / Kclst
2686	RCRA-S	to monitor alluvial groundwater downgradient of Solar Evaporation Ponds	Qrf
2786	RCRA-C	to monitor bedrock groundwater downgradient (east) of Solar Evaporation Ponds	Kssltss / Ksclst
3086	RCRA-S	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds	Kclst
3286	RCRA-C	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds	Kss / Ksltss
3386	RCRA-C	to monitor alluvial groundwater downgradient (south) of Solar Evaporation Ponds	Qrf
3486	RCRA-C	to monitor bedrock groundwater downgradient (east-southeast) of Solar Evaporation Ponds	Kcss / Kcslt
3586	RCRA-C	to monitor alluvial groundwater downgradient (east-southeast) of Solar Evaporation Ponds	Qc
3686	RCRA-C	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds (in South Walnut Creek drainage)	Qc
4686	RCRA-C	to monitor bedrock groundwater north of West Spray Field	Kslt / Kcslt
4786	RCRA-C	to monitor alluvial groundwater north of West Spray Field	Qrf
4886	RCRA-C	to monitor bedrock groundwater at West Spray Field	Ksslt / Kcslt
4986	RCRA-C	to monitor alluvial groundwater at West Spray Field	Qrf
5086	RCRA-S	to monitor alluvial groundwater inside south boundary of West Spray Field	Qrf
5186	RCRA-S	to monitor alluvial groundwater upgradient (west) of West Spray Field	Qrf
5286	RCRA-C	to monitor bedrock groundwater west of West Spray Field (currently inactive)	Kss / Ksltclst
5686	RCRA-C	to monitor alluvial groundwater southeast of West Spray Field (in Woman Creek)	Qc
6186	CERCLA	characterization for Industrial Area IM/IRA	Qrf
2187	RCRA-C	to monitor alluvial groundwater downgradient (southeast) of Solar Evaporation Ponds	Qc
2287	RCRA-C	to monitor bedrock groundwater downgradient (southeast) of Solar Evaporation Ponds	Kss / Kslt
3887	RCRA-S	to monitor alluvial groundwater downgradient (south edge) of Solar Evaporation Ponds	Qrf
3987	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (south of french drain)	Ksslt / Kclst
4087	RCRA-S	to monitor alluvial groundwater downgradient (east) of Present Landfill	Qc
4187	RCRA-S	to monitor bedrock groundwater downgradient (east) of Present Landfill	Ksltss
4287	RCRA-C	to monitor alluvial groundwater downgradient (east) of Present Landfill (east of dam)	Qc
5687	RCRA-C	to monitor alluvial groundwater at Solar Evaporation Ponds	Qrf
5887	RCRA-S	to monitor alluvial groundwater upgradient (west) of Present Landfill	Qrf
6087	RCRA-S	to monitor alluvial groundwater upgradient (north) of Present Landfill	Qrf
6187	RCRA-C	to monitor alluvial groundwater upgradient (north) of Present Landfill (replaces Well 6287)	Qrf
6487	RCRA-C	to monitor alluvial groundwater at Present Landfill	Qrf
6587	RCRA-C	to monitor alluvial groundwater at Present Landfill	Qrf
6687	RCRA-C	to monitor alluvial groundwater upgradient (south) of Present Landfill	Qrf
6887	RCRA-C	to monitor alluvial groundwater at Present Landfill	Qrf

Table 4-3

Wells Recommended For Quarterly Sampling And Analysis[1]

Well ID	Proposed Well Classification[2]	Well Purpose	Unit or Lithology Screened[3]
7087	RCRA-C	to monitor alluvial groundwater upgradient (south) of Present Landfill	Qrf
7187	RCRA-C	to monitor alluvial groundwater upgradient (north) of Present Landfill	Qrf
7287	RCRA-C	to monitor alluvial groundwater upgradient (south) of Present Landfill	Qrf
B 106089	RCRA-C	to monitor alluvial groundwater at or upgradient (west) of Present Landfill	Qrf
B 110889	RCRA-S	to monitor alluvial groundwater downgradient (east) of West Spray Field	Qrf
B 110989	RCRA-S	to monitor alluvial groundwater downgradient (north) of West Spray Field	Qrf
B 111189	RCRA-S	to monitor alluvial groundwater downgradient (north) of West Spray Field	Qrf
P 114389	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114489	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114589	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114689	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114789	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114889	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 114989	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 115089	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 115489	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 115589	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 115689	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 119389	CERCLA	characterization for Industrial Area IM/IRA	Qrf
B 206289	RCRA-C	to monitor bedrock groundwater upgradient (south) of Present Landfill	Ksltclst / Kclst
B 206489	RCRA-C	to monitor alluvial groundwater upgradient (south) of Present Landfill	Qrf / Ksltclst
B 206589	RCRA-C	to monitor bedrock groundwater upgradient (east) of Present Landfill	Kclst
B 206689	RCRA-C	to monitor bedrock groundwater upgradient (east) of Present Landfill	Ksltclst
B 206789	RCRA-C	to monitor bedrock groundwater downgradient (east) of Present Landfill	Kclst
B 206889	RCRA-C	to monitor bedrock groundwater downgradient (east) of Present Landfill (east of dam)	Ksltclst
B 206989	RCRA-S	to monitor bedrock groundwater downgradient (east) of Present Landfill	Ksclst
B 207089	RCRA-S	to monitor bedrock groundwater downgradient (east) of Present Landfill	Ksclst / Ksltclst
P 207389	RCRA-S	to monitor bedrock groundwater upgradient (southwest) of Solar Evaporation Ponds	Kss / Kclst
P 207589	RCRA-S	to monitor bedrock groundwater downgradient (south) of Solar Evaporation Ponds	Ksltclst
P 207689	RCRA-S	to monitor alluvial groundwater downgradient (south and east) of Solar Evaporation Ponds	Qrf
P 207789	RCRA-S	to monitor bedrock groundwater downgradient (south and east) of Solar Evaporation Ponds	Ksltclst
P 207889	RCRA-S	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds	Qrf
P 207989	RCRA-S	to monitor bedrock groundwater downgradient (east) of Solar Evaporation Ponds	Kclst
B 208089	RCRA-C	to monitor alluvial groundwater downgradient (northeast) of Solar Evaporation Ponds (downgradient of french drain)	Qc
B 208189	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (downgradient of french drain)	Kclst
B 208289	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek drainage)	Ksltclst / Kclst
B 208689	RCRA-C	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek drainage) (replaces Well B210389)	Ksltclst
P 208889	RCRA-C	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds (south of french drain)	Ksltclst
P 208989	RCRA-S	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds	Ksltss / Ksltclst
P 209089	RCRA-C	to monitor bedrock groundwater at Solar Evaporation Ponds	Ksltclst
P 209289	RCRA-S	to monitor alluvial groundwater upgradient (west) of Solar Evaporation Ponds	Qrf
P 209389	RCRA-S	to monitor bedrock groundwater upgradient (west) of Solar Evaporation Ponds (currently inactive)	Kss / Ksltss / Kcss
P 209489	RCRA-S	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds	Kss / Ksltss
P 209589	RCRA-S	to monitor bedrock groundwater downgradient (northeast) of Solar Evaporation Ponds	Ksltclst / Ksclst
P 209689	RCRA-S	to monitor bedrock groundwater downgradient (east) of Solar Evaporation Ponds	Ksltclst
P 209789	RCRA-S	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds	Qrf
P 209889	RCRA-C	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds (south of french drain)	Ksltclst
P 210089	RCRA-C	to monitor bedrock groundwater downgradient (north) of Solar Evaporation Ponds (north of french drain)	Ksltclst

~~123~~
173

Table 4-3

Wells Recommended For Quarterly Sampling And Analysis[1]

Well ID	Proposed Well Classification[2]	Well Purpose	Unit or Lithology Screened[3]
P 210189	RCRA-C	to monitor bedrock groundwater at Solar Evaporation Ponds (replaces Well B209189)	Ksltss / Ksclst
B 210489	RCRA-C	to monitor alluvial groundwater downgradient (northeast) of Solar Evaporation Ponds (in North Walnut Creek drainage) (replaces Well B208589)	Qc
P 213689	CERCLA	characterization for Industrial Area IM/IRA	Qrf
B 213789	CERCLA	characterization for Industrial Area IM/IRA	Qc
P 213889	CERCLA	characterization for Industrial Area IM/IRA	Kss / Kcss
P 213989	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 215789	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 218289	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 218389	RCRA-C	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds	Qrf
P 219189	CERCLA	characterization for Industrial Area IM/IRA	Qc
P 219489	RCRA-C	to monitor alluvial groundwater downgradient (southeast) of Solar Evaporation Ponds	Qrf
P 219589	RCRA-C	to monitor alluvial groundwater downgradient (southeast) of Solar Evaporation Ponds	Kclst / Ksclst
P 313489	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 313589	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 314089	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 314289	CERCLA	characterization for Industrial Area IM/IRA	Qrf
B 410589	RCRA-S	to monitor alluvial groundwater downgradient (south) of West Spray Field	Qrf
B 410689	RCRA-S	to monitor alluvial groundwater downgradient (south) of West Spray Field	Qrf
B 410789	RCRA-S	to monitor alluvial groundwater downgradient (east) of West Spray Field	Qrf
B 411289	RCRA-C	to monitor alluvial groundwater at West Spray Field	Qrf
B 411389	RCRA-C	to monitor alluvial groundwater at West Spray Field	Qrf
P 414189	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 415889	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 415989	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416089	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416189	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416289	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416389	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416489	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416589	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416689	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416789	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416889	CERCLA	characterization for Industrial Area IM/IRA	Qrf
P 416989	CERCLA	characterization for Industrial Area IM/IRA (currently inactive)	Ksslt / Kslt
P 419689	CERCLA	characterization for Industrial Area IM/IRA	Qrf / Kss
00190	NL	to monitor alluvial groundwater at proposed site of new landfill	Qrf
00290	NL	to monitor alluvial groundwater at proposed site of new landfill	Qrf
00390	NL	to monitor alluvial groundwater at proposed site of new landfill	Qrf
01490	NL	to monitor alluvial groundwater at proposed site of new landfill	Qrf
06491	Boundary - AIP	to monitor east boundary bedrock groundwater in 2nd drainage north of Central Ave.	Ksltss / Ksclst
40491	Boundary - AIP	to monitor east boundary alluvial groundwater in 1st drainage north of Central Ave. (will replace Well 0386)	Qa
40791	Boundary - AIP	to monitor east boundary alluvial groundwater near Mower Ditch drainage (will replace Well 0386)	Qc
41491	Boundary - AIP	to monitor east boundary alluvial/bedrock groundwater in Woman Creek drainage (will replace Well 0186)	Qa
41591	Boundary - AIP	to monitor east boundary alluvial groundwater just south of Central Ave. (replaces Well 0286)	Qc
41691	Boundary - AIP	to monitor east boundary alluvial groundwater in Walnut Creek drainage (replaces Well 0486)	Qa
45391	CERCLA	881 Hillside characterization & monitoring	Qc
10292	CERCLA	881 Hillside characterization & monitoring	Ksltclst / Kcslt
10492	CERCLA	881 Hillside characterization & monitoring	Kcss / Ksltclst

174

Table 4-3

Wells Recommended For Quarterly Sampling And Analysis[1]

Well ID	Proposed Well Classification[2]	Well Purpose	Unit or Lithology Screened[3]
10592	CERCLA	881 Hillside characterization & monitoring	Qc
10692	CERCLA	881 Hillside characterization & monitoring	Qc
10792	CERCLA	881 Hillside characterization & monitoring	Ksltss
10992	CERCLA	881 Hillside characterization & monitoring	Qc
11092	CERCLA	881 Hillside characterization & monitoring	Qc
43392	CERCLA	characterization for Industrial Area IM/IRA	Qrf
46192	RCRA-S	to monitor alluvial groundwater upgradient (west) of West Spray Field (replaces Well 1081 & 0782)	Qrf
46292	RCRA-C	to monitor alluvial groundwater at West Spray Field	Qrf
00393	RCRA-C	to monitor alluvial groundwater at Present Landfill (replaces Well 6787)	Qrf
00493	RCRA-C	to monitor alluvial groundwater at Present Landfill (replaces Well B206389)	Ksclst / Kcss
05093	RCRA-S	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds (replaces Well 2886)	Qrf
05193	RCRA-S	to monitor alluvial groundwater downgradient (east) of Solar Evaporation Ponds (replaces Well 3787)	Qrf
05293	RCRA-S	to monitor alluvial groundwater upgradient (southwest) of Solar Evaporation Ponds (replaces Well P207489)	Qrf
05393	RCRA-S	to monitor bedrock groundwater downgradient (east) of Solar Evaporation Ponds (eplaces Well P210289)	Ksclst / Ksslst

1 SOURCE OF INFORMATION:
RCRA-S and RCRA-C: Final Ground Water Assessment Plan (EG&G, 1993)
Boundary - AIP: Agreement In Principal (D.O.E./State of Colorado, 1989)
NL: Groundwater Monitoring Plan for the New Sanitary Landfill (EG&G, 1993)
CERCLA: Groundwater Sample Request Form (EG&G internal document, 9/17/93)
Selected from wells known to exist as of June, 1993.

2 Boundary - AIP = Boundary monitoring wells currently required (by CDH) to be sampled and analyzed
RCRA-C = RCRA characterization monitoring wells - information used to "determine the rate and extent of migration of hazardous waste or hazardous waste constituents

RCRA-S = monitoring wells used for RCRA statistical comparisons [40 CFR 265.93(b) and 265.94(a)(2)(ii)]
CERCLA = monitoring wells specified in RFI/RI work plans. Industrial Area IM/IRA characterization wells will convert to "Plant Protection" wells (source characterization of

NL = Pre-permit monitoring wells for the new landfill

3 Kss = Cretaceous sandstone
Kclst = Cretaceous claystone
Kcslt = Cretaceous clayey siltstone
Kcss = Cretaceous clayey sandstone
Ksclst = Cretaceous sandy claystone
Kslt = Cretaceous siltstone
Ksltclst = Cretaceous silty claystone
Ksltss = Cretaceous silty sandstone
Ksslt = Cretaceous sandy siltstone
Qa = Quaternary alluvium
Qc = Quaternary colluvium
Qrf = Quaternary Rocky Flats alluvium

\250308\4-3.XLS 4/29/94 2:58 PM

175

Table 4-4

Wells Recommended for Elimination from Sampling Program[1]

Well ID	Reason For Elimination
1886	chronically dry
2486	chronically dry
2986	chronically dry
3186	chronically dry
5486	adequate coverage provided by nearby wells
5586	adequate coverage provided by nearby wells
5786	adequate coverage provided by nearby wells
5886	adequate coverage provided by nearby wells
6786	chronically dry
0587	adequate coverage provided by nearby wells
1087	chronically dry
1287	produces little water / adequate coverage provided by nearby wells
1987	chronically dry
2087	produces little water / adequate coverage provided by nearby wells
2487	chronically dry
2787	chronically dry
3587	chronically dry
4487	chronically dry
4787	chronically dry
4887	chronically dry
4987	chronically dry
5087	chronically dry
5387	produces little water / adequate coverage provided by nearby wells
5487	produces little water / adequate coverage provided by nearby wells
B 102389	Background Geochemical Characterization Well - Program Completed
B 200689	Background Geochemical Characterization Well - Program Completed
B 200789	Background Geochemical Characterization Well - Program Completed
B 201089	Background Geochemical Characterization Well - Program Completed
B 201289	Background Geochemical Characterization Well - Program Completed
B 201589	Background Geochemical Characterization Well - Program Completed
B 203289	Background Geochemical Characterization Well - Program Completed
B 203489	Background Geochemical Characterization Well - Program Completed
B 203789	Background Geochemical Characterization Well - Program Completed
B 203989	Background Geochemical Characterization Well - Program Completed
B 204189	Background Geochemical Characterization Well - Program Completed
B 207289	chronically dry
B 208389	chronically dry
B 208489	chronically dry
B 218789	adequate coverage provided by nearby wells
B 302989	Background Geochemical Characterization Well - Program Completed
B 304789	Background Geochemical Characterization Well - Program Completed
B 317189	chronically dry
B 320089	adequate coverage provided by nearby wells
B 400289	Background Geochemical Characterization Well - Program Completed
B 400389	Background Geochemical Characterization Well - Program Completed
B 401989	Background Geochemical Characterization Well - Program Completed

176 176

Table 4-4

Wells Recommended for Elimination from Sampling Program[1]

Well ID	Reason For Elimination
B 405189	Background Geochemical Characterization Well - Program Completed
B 405289	Background Geochemical Characterization Well - Program Completed
B 405489	Background Geochemical Characterization Well - Program Completed
B 405689	Background Geochemical Characterization Well - Program Completed
B 405789	Background Geochemical Characterization Well - Program Completed
00590	adequate coverage provided by nearby wells
00690	adequate coverage provided by nearby wells
00790	adequate coverage provided by nearby wells
00990	adequate coverage provided by nearby wells
00691	chronically dry
00791	chronically dry
00891	chronically dry
00991	chronically dry
01991	adequate coverage provided by nearby wells
02791	chronically dry
02891	chronically dry
02991	adequate coverage provided by nearby wells
03191	chronically dry
03891	chronically dry
04891	chronically dry
05691	adequate coverage provided by nearby wells
06291	produces little water / adequate coverage provided by nearby wells
06691	adequate coverage provided by nearby wells
06891	adequate coverage provided by nearby wells
06991	adequate coverage provided by nearby wells
07191	adequate coverage provided by nearby wells
07291	produces little water / adequate coverage provided by nearby wells
07391	well screened across two geologic units
08091	chronically dry
08291	adequate coverage provided by nearby wells
08491	adequate coverage provided by nearby wells
08591	chronically dry
11291	chronically dry
11491	chronically dry
12291	adequate coverage provided by nearby wells
12491	adequate coverage provided by nearby wells
12691	adequate coverage provided by nearby wells
12891	adequate coverage provided by nearby wells
13091	adequate coverage provided by nearby wells
13591	chronically dry
31491	well screened across two geologic units
31791	well screened across two geologic units
31891	well screened across two geologic units
32591	adequate coverage provided by nearby wells
33491	chronically dry
33691	adequate coverage provided by nearby wells

171

177

Table 4-4

Wells Recommended for Elimination from Sampling Program[1]

Well ID	Reason For Elimination
33891	produces little water / adequate coverage provided by nearby wells
34591	adequate coverage provided by nearby wells
35391	chronically dry
35991	adequate coverage provided by nearby wells
36391	adequate coverage provided by nearby wells
36691	produces little water / adequate coverage provided by nearby wells
36991	chronically dry
37191	adequate coverage provided by nearby wells
38191	adequate coverage provided by nearby wells
38291	adequate coverage provided by nearby wells
38891	adequate coverage provided by nearby wells
39191	adequate coverage provided by nearby wells
45091	Wind Energy Site
45191	Wind Energy Site
45291	Wind Energy Site
03092	chronically dry
03192	chronically dry
10092	chronically dry
10192	chronically dry
10392	chronically dry
10892	chronically dry
43492	well screened across two geologic units

[1] Selected from wells listed as active as of June, 1993

4.2.1.1 Monitor Well Selection Process

The monitoring network needs to effectively address areas of current, potential, and future concern. In areas of potential concern, additional monitoring wells may be required to improve spatial definition of contamination distributions or monitor future contaminant movement. The following steps were used to select monitoring wells and design the monitoring network:

- Identify areas of potential concern (present and future)
- Identify wells useful for monitoring in these areas
- Identify contaminants of concern
- Determine sampling and analysis frequency

Areas of potential concern were selected based on their locations relative to known sources of waste disposal, contamination identified on concentration contour maps, surface-water drainages, and potential contaminant migration pathways. These include the eastern and western boundaries, drainages, OU-specific areas, and buffer zone areas flanking the industrial area. Some portions of RFP do not presently contain groundwater contamination but are considered important from a sitewide monitoring perspective (e.g., plant boundaries) and are also considered areas of potential concern.

Wells within areas of potential concern that can be used to meet monitoring objectives have been identified based on their location relative to contaminant source areas, the estimated extent of contaminant plumes, and the potential contaminant migration pathways. By using hydrogeologic maps and cross sections (Section 2.1), potentiometric maps (Section 2.2), and concentration contour (plume) maps (Section 2.3), a list of wells was compiled for inclusion in the monitoring network. Wells were selected within plumes, upgradient and downgradient of the plumes, and laterally along the plume margins. Potentiometric maps were used to predict potential contaminant migration pathways, and wells were selected along these pathways. Seep maps were used to identify locations where groundwater may be discharging to the ground surface. Wells were selected upgradient of the seeps to monitor groundwater in the event that discharge points become points of compliance. Additionally, wells located in potential source areas, drainages, along the eastern boundary, and in the buffer zone were identified for monitoring.

Wells were also considered for inclusion in the monitoring network based on lithology. Closely spaced wells screening different units were identified for inclusion in the network to monitor groundwater quality in the vertical dimension. Geologic logs were reviewed to identify wells screened across similar lithostratigraphic intervals. Wells were selected to monitor unconsolidated surficial deposits, weathered and unweathered bedrock, and the No. 1 sandstone. Well production data were also reviewed. Wells screened in zones containing higher percentages of sandy material were frequently selected over wells screened in zones containing higher percentages of clayey and silty material. Wells yielding sufficient quantities of water for analyses were frequently selected over wells that exhibit low groundwater yield. Generally, the number of wells in the eastern industrial area was sufficient to allow for the consideration of the wells based on lithology. In other areas that did not contain multiple wells for consideration, the lithology of the screened interval was a less important factor in the selection process than the surface location of the well.

As discussed in Section 2.3, one of the most important findings of the geochemical data analysis was the conclusion that the spatial distribution of contaminant plumes has not significantly changed from 1990 to 1992. Therefore, the current quarterly monitoring of wells for the purpose of defining the nature and extent of contamination on a sitewide basis may not be technically warranted. At the same time, the geochemical data indicate that some seasonal variation in analyte concentrations in groundwater does occur. In order to identify the range of chemical variation that may be possible in the groundwater at RFP, a sampling frequency of twice per year (at high-water and low-water periods) is proposed for the site. Normally, this involves the second and fourth quarters of the year. By conducting semiannual sampling during these periods, seasonal variations in chemical concentration can be monitored. For wells that dewater allowing only partial sample suites to be collected, it is recommended that the samples needed to complete a full analytical sample suite be collected during the interim quarters, or that purging and sampling protocols be modified.

4.2.1.2 Recommendations for Monitoring of Additional Areas

Several areas were identified as requiring further characterization. These areas (shown in Plate 4-3) are the western boundary of the site, surface-water drainages east of the industrial area, and the area southeast of the East Trenches. In order to more completely characterize the groundwater quality and flow hydraulics at RFP, additional monitoring wells are recommended in the following areas:

- Wells are proposed along the western boundary of the facility to monitor for potential releases occurring upgradient of RFP. Wells are recommended near the three Rock Creek tributaries, plus Upper Church Ditch, and McKay Ditch. Wells also are recommended adjacent to the Fox Hills Formation west of RFP.

- Wells along and within the No Name Creek, Walnut Creek, and Woman Creek drainages and an unnamed drainage at the eastern boundary are proposed to monitor water levels and potential contaminant migration adjacent to creeks and identify gaining versus losing reaches of those creeks. Limited data suggest that valley-fill alluvium is recharged, even from deeper bedrock units, in the area of relatively high relief in the middle and eastern portions of the industrial area. This process appears to reverse to the east where water in valley-fill alluvium discharges to deeper units (based on only one cluster well located near the eastern boundary in the Walnut Creek drainage). This area of gradient reversal needs to be identified through seasonal monitoring of water levels in cluster wells to determine the point at which contaminants may cease to be concentrated in the valley-fill alluvium and instead may begin to migrate into the surrounding material. This requires vertically and laterally comparable potentiometric data from the valley-fill alluvium adjacent to streams. Further, these wells should be monitored quarterly until this scenario is characterized. A determination of the appropriate number and precise locations of proposed wells should be evaluated after sufficient data are gathered from wells recently installed in these drainages by the OU5 and OU6 groundwater characterization programs.

- Additional wells along the southern portion of the east-trending plumes from the East Trenches are recommended to monitor potential contaminants migration south to the Woman Creek drainage. The number and precise locations of proposed wells are not included in this discussion because additional efforts involving subsurface geologic correlations and determination of precise flow directions are necessary. Additional wells are recommended in the vicinity of the Solar Evaporation Ponds to further characterize the bedrock paleotopographic surface and assess leakage from the groundwater intercept system.

4.2.2 Quarterly Monitoring Network

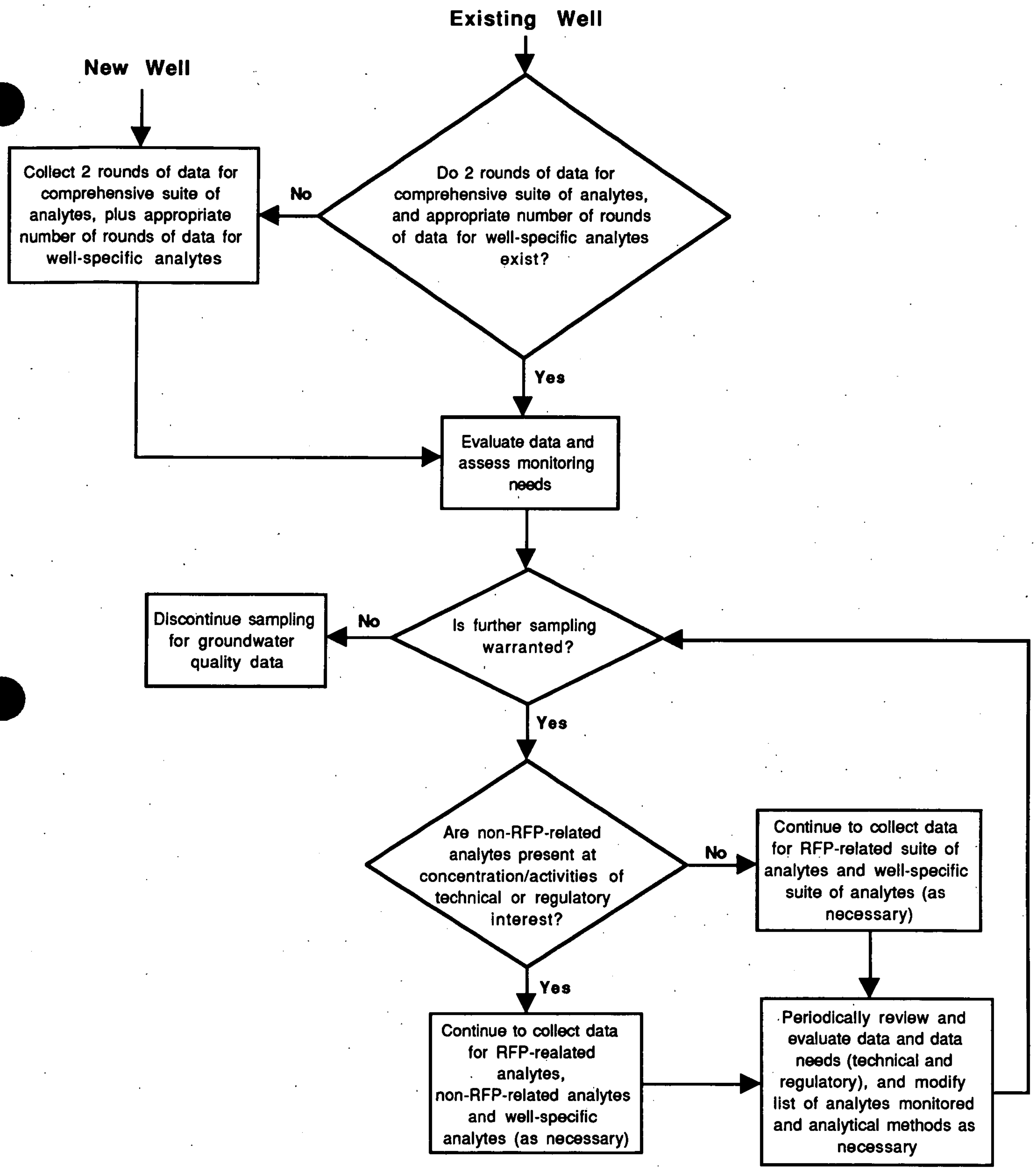
The proposed Quarterly Monitoring Network comprises 158 existing wells listed in Table 4-3 and shown in Plate 4-2. These wells fulfill the regulatory requirements applicable to RFP and include wells classified as RCRA-C and RCRA-S.

However, the need for sampling wells classified as RCRA-C on a quarterly basis should be evaluated. These wells are used to evaluate the nature and extent of contamination associated with RCRA units. Unlike RCRA compliance boundary wells (identified as RCRA-S in Table 3-2), which are sampled quarterly to obtain data for statistical analysis, the regulations do not specify a sampling frequency for wells used to characterize the nature and extent of contamination. Although it is often assumed that these wells must be monitored quarterly like the RCRA-S wells, a different sampling frequency may be warranted based on technical arguments. As discussed in Section 2.3, the spatial distribution of contaminant plumes has not significantly changed from 1990 to 1992. Therefore, frequent sampling on a quarterly basis to evaluate the movement and extent of contaminant migration may not be technically warranted. It is recommended that data quality objectives (DQOs) for the quality and quantity of data from RCRA-C wells be established to evaluate if and when semiannual monitoring will be sufficient to meet characterization objectives.

4.3 Groundwater Analytical Suite

Groundwater quality data from RFP are used for a variety of purposes, including determining the presence or absence and nature and extent of contamination, evaluating groundwater quality relative to standards, fulfilling regulatory requirements, and supporting risk assessment needs. For this reason, use of an exhaustive analytical suite for all groundwater samples is neither required nor appropriate from a technical perspective. The analytical suite used to provide data for each of the purposes listed above should be designed to fit specific data needs and uses. Figure 4-1 presents a flow chart for the selection of analytical suites appropriate for the intended data needs. The three analytical suites are: a comprehensive suite (Table 4-5); an RFP-related suite (Table 4-6); and a well-specific suite (which may include non-RFP related analytes).

182 182



Note: For wells currently requiring monitoring for regulatory compliance, changes to monitoring must be approved by the regulatory agency.

EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

FLOW DIAGRAM FOR SELECTING APPROPRIATE ANALYTICAL SUITE FOR GROUNDWATER SAMPLING AT ROCKY FLATS PLANT

Well Evaluation Report

Date: April 1994	Figure 4-1

m\es\Appropriate Analytical.flw\4-25-94

183

183

Table 4-5
Proposed Comprehensive Analytical Suite

Analyte
VOCs
Water Quality Parameters (TDS, TSS, Cl, F, SO_4, CO_3, HCO_3)
Nitrate/Nitrite as N
Gross Alpha, Gross Beta (dissolved)
Uranium-233, 234; Uranium-235; Uranium-238 (dissolved)
Cesium-137 (dissolved)
Strontium-89, 90 (dissolved)
CLP Standard and Additional Metals (dissolved) (Additional metals include cesium, lithium, molybdenum, strontium, and tin)
Tritium
Plutonium-239, 240 (total)
Americium-241 (total)
Cyanide
Orthophosphate
SVOCs
CLP Pesticides/PCBs
CLP Standard and Additional Metals (total)
Plutonium-239, 240 (dissolved)
Americium-241 (dissolved)
Herbicides

Table 4-6
Proposed RFP-Related Analytical Suite

Analyte
Volatile Organic Compounds
Water Quality Parameters (TDS, TSS, Cl, F, SO_4, CO_3, HCO_3)
Nitrate/Nitrite as N
Gross Alpha, Gross Beta (dissolved)
Uranium-233, 234; Uranium-235; Uranium-238 (dissolved)
CLP Standard and Additional Metals (dissolved) (Additional metals include cesium, lithium, molybdenum, strontium, and tin)
Tritium
Plutonium-239, 240 (total)
Americium-241 (total)

As the name implies, the comprehensive suite is an extensive analytical suite intended to establish the presence or absence of a broad list of groundwater contaminants, including all constituents having applicable groundwater and surface-water standards. Even constituents that are not associated with historical production and waste generation activities at RFP, such as pesticides, PCBs, and polyaromatic hydrocarbons (PAHs), are included in this suite. The comprehensive analytical suite also includes total metal concentrations and radionuclide activities in order to provide data that will support risk assessment objectives. The results of the comprehensive suite analyses will be used to accomplish the following:

- Identify sources of contamination
- Monitor potential impacts to groundwater from upgradient sources
- Verify that non-RFP related constituents are not present in groundwater
- Characterize the extent of RFP-related groundwater contamination
- Fulfill groundwater-ingestion exposure scenario

The comprehensive list of analytes should be reviewed periodically and updated to reflect current technical and regulatory data needs. Two rounds of comprehensive sampling and analysis are recommended. Following these two rounds, the analytical suite may be reduced to the more limited RFP-related suite (discussed below). At the same time, the results of the comprehensive analyses will be reviewed to identify detectable concentrations of any non-RFT-related constituents. If such constituents have been detected, then continued monitoring also may be needed for those constituents (in addition to the RFP-related list of constituents).

The RFP-related suite addresses the majority of analytes and analyte groups that are associated with past and present RFP production and waste generation activities. Data from the RFP-related suite will be used to accomplish the following:

- Characterize the nature and extent of contamination
- Reassess the impacts related to various sources of contamination
- Monitor plume movement

The RFP-related suite would be applied to samples at a large number of wells on semiannual basis (as discussed previously), allowing chemical concentrations in groundwater to be contoured with a reasonable degree of accuracy. The RFP-related suite should be reviewed periodically and updated to reflect current data needs.

The well-specific suite addresses analytical data needs at individual well location, and would include such analytes as regulatory (ex. RCRA or CERCLA) or technical (such as plume monitoring) needs for that individual well. For example, analytes required to be monitored by RCRA regulations would be included as part of the well-specific suite. Another example may be an analyte which is below concentrations of concern in a well, but that well happens to be located near a plume of that analyte (i.e., analysis would be used to monitor the movement of the plume front). Like the other suites, the well-specific suite for each well should be reviewed periodically and updated to reflect the current data needs. Identification of well-specific suites is beyond the scope of this report, and as such, are not presented.

4.4 Point of Compliance

The point of compliance is a regulatory term referring to the boundary at which groundwater standards must be attained. Although points of compliance exist for the three RCRA-regulated units, a point-of-compliance boundary for the RFP site has not yet been determined. As discussed in Section 3.2.3, the CWQCC is charged with establishing groundwater classifications and assigning groundwater standards to ensure that beneficial use of groundwater at RFP is sustained. However, because of CWQCC currently has no enforcement capabilities, CDH probably would be responsible for implementation and enforcement of attainment of groundwater standards at RFP. If groundwater standards are enforced at RFP on a sitewide basis (rather than only for RCRA-related units), several options exist for the point-of-compliance boundary. The regulatory, technical, economic, and health-protective aspects of four of the more likely options are discussed in *The Groundwater Protection Program Review* (WWE, 1993c). Based on that document and information presented in this report, the recommended sitewide point of compliance is the eastern boundary of RFP at Indiana Street. This compliance boundary should be coupled with a strategic defense line of monitoring wells designed to assess groundwater quality and contaminant migration upgradient of Indiana Street. The proposed Semiannual Monitoring Network coupled with additional wells discussed in Section 4.2.1.2 (Recommendations for Monitoring Additional

Areas) constitute this strategic defense monitoring network. Data from these wells would be used to identify migration of contaminants well in advance of the Indiana Street boundary, provide an early warning that an interim measure may be necessary, and prevent triggering an enforcement action as a result of exceedances in wells at the compliance boundary.

4.5 Recommendation for Future Activities

Recommendation for future work include additional characterization and data evaluation activities, improvements to data quality and usability, and an evaluation of analytical suites and laboratory methodologies to ensure usable data are obtained for comparison to applicable or relevant and appropriate requirements (ARARs).

4.5.1 Additional Characterization and Data Evaluation Activities

Additional characterization and data evaluation activities recommended to further characterize the geologic, hydrogeologic, and geochemical aspects of the conceptual site model for groundwater flow and contaminant transport presented in this report are discussed below.

4.5.1.1 Geological Characterization

To further evaluate the characteristics of geologic media at RFP that influence groundwater flow and contaminant transport, the following activities are recommended:

- Update geologic correlations using recent borehole and well logs, geophysical data, and other available information to better characterize lithologic units at RFP.
- Evaluate the occurrence and distribution of faults and fractures in consolidated bedrock that may act as preferential contaminant migration pathways.
- Investigate the presence of sandstones subcropping beneath dams that may act as preferential contaminant migration pathways.
- Further characterize the bedrock paleotopographic surface to determine its effect on groundwater flow.

4.5.1.2 Hydrogeologic Characterization

To further characterize the groundwater flow regime, identify preferential groundwater flowpaths, and evaluate contaminant transport, the following activities are recommended:

- Identify seep locations more accurately to better describe surface water/groundwater interactions.

- Evaluate the need for additional wells upgradient of seeps to monitor for compliance with Segment 4 and 5 water standards.

- Determine the ranges of values and calculate the average value of hydraulic parameters for various lithologic units to characterize the hydrostratigraphic units at RFP and identify preferential groundwater flow paths.

- Determine which wells screened in bedrock are screened in the upper hydrostratigraphic unit, and which ones are screened in the lower hydrostratgraphic unit.

- Construct groundwater potutometric surface maps based on hydrostratigraphic units rather than lithostratigraphic units.

- Evaluate flow of impounded surface water into bedrock and through embankment foundations at the A-, B-, And C-series ponds and East Landfill Pond to characterize seepage through dams and the potential for contaminant transport.

- Characterize the potentiometric surface in unconsolidated surficial materials adjacent to outcrops of the Fox Hills Sandstone west of RFP.

- Further characterize vertical hydraulic gradients between valley-fill alluvium and shallow bedrock.

- Perform sitewide groundwater flow modeling.

- Perform a sitewide water balance to characterize the hydrologic system and estimate the flux of water existing the RFP in valley-fill alluvium.

4.5.1.3 Geochemical Characterization

To better characterize the distribution and transport of contaminants at RFP, the following activities are recommended:

- Construct concentration contour maps based on hydrostratigraphic units rather than lithostratigraphic units.
- Assess hydrogeologic and geochemical data from isolated areas (i.e., point sources) of potential contamination to verify single detections and/or determine the reason for presence of contamination.
- Continue to evaluate groundwater geochemical data to determine the nature of seasonal variations and long-term temporal trends and the driving mechanisms for these temporal changes.
- Evaluate contaminant concentrations in monitoring wells upgradient and downgradient of the groundwater intercept systems at OU1 and OU4 to assess their performance.
- Conduct a detailed fate and transport modeling study to predict contaminant migration and identify areas requiring additional monitoring well coverage east of the industrialized area.
- Install wells to characterize groundwater flow and monitor contaminant transport in the valley-fill alluvium in the easternmost zone of RFP.
- Retain existing wells presently used to characterize the western industrial area in support of the IM/IRA for long-term monitoring and source characterization of the Original Process Waste Lines or other potential sources of contamination.
- Initiate a program to analyze select groundwater samples for Appendix IX parameters to determine the presence or absence of contaminants and thus better define the analytical suite for RFP.

4.5.2 *Improving Data Quality and Usability*

Recommendation for improving the quality and usability of physical and chemical data used to design and evaluate the groundwater monitoring program at RFP include:

- Interpret the groundwater quality control (QC) sample results to assess the overall usability of groundwater chemical data with respect to precision, accuracy, reproductibility, comparability, and completeness.
- Evaluate the occurrence of contamination in rinsate and field blanks.
- Evaluate the adequacy of the SOP for water-level measurements that is currently in use (SOP GW.01 - *Water Level Measurements in Wells and Piezometers;* EG&G, 1992e) to ensure that (1) water levels in low-yield wells have fully recovered after chemical sampling before new water-level measurements are obtained and (2) water retained in well sumps is not misinterpreted as representing actual groundwater elevations.
- Evaluate the adequacy of SOPs for purging and sampling wells to ensure that complete and representative groundwater samples are collected (especially for low yield wells).

4.5.3 *Evaluation of Analytical Suites and Methods of Laboratory Analyses*

Identification of ARARs is needed to determine which analytes need to be monitored at RFP. Laboratory analytical methods currently used should be evaluated to ensure that the quantitation limits provide data suitable for comparison to ARARs. Periodically, data needs and ARARs should be reviewed to ensure that appropriate analytical methods are being used.

191

191

5.0 REFERENCES

Bates, R.L., and J.A. Jackson (eds). 1987. *Glossary of Geology*. American Geological Institute. Alexandria, Virginia.

CFR (Code of Federal Regulations). 1992a. *National Oil and Hazardous Substances Pollution Contingency Plan*. 40 CFR Part 300.

CFR. 1992b. *Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*. 40 CFR Part 264

CFR. 1992c. *Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities*. 40 CFR Part 265.

CDH-CWQCC (Colorado Department of Health - Colorado Water Quality Control Commission). 1991a. *Classifications and Water Quality Standards for Ground Water* 3.12.0 (5 CCR 1002-8). Amended September 19, 1991. Effective October 30, 1991.

CDH-CWQCC. 1991b. *The Basic Standards for Ground Water*. 3.11.0 (5 CCR 1002-8). Amended October 8, 1991. Effective November 30, 1991.

CDH-CWQCC. 1992. *Regulations for State Discharge Permit Systems - Groundwater*. 6.15.0 (5 CCR 1002-8). Amended April 7, 1992. Effective July 1, 1993.

CDH-CWQCC. 1993. *The Basic Standards and Methodologies for Surface Water*. 3.1.0 (5 CCR 1002-8). Amended May 4, 1993. Effective July 1, 1993.

Cooper, David. 1993. Chief Remedial Guidance Section, Office of Emergency and Remedial Response. U.S. EPA. Personal communication.

DOE, CDH (U.S. Department of Energy and State of Colorado). 1989. *Agreement in Principle*. June 28, 1989.

DOE, EPA (U.S. Department of Energy, U.S. Environmental Protection Agency). 1991. *NPDES Federal Facility Compliance Agreement (FFCA-NPDES)*. March 5, 1991.

DOE, EPA, CDH (U.S. Department of Energy, U.S. Environmental Protection Agency Region VIII, and the State of Colorado). 1991. *Rocky Flats Interagency Agreement*. January 22, 1991.

Duplancic, N. 1993. Stop Superfund Stagnation. *Civil Engineering.* March 1993.

EG&G. 1990a. *Rocky Flats Plant Well Abandonment/Replacement Program Plan.* EG&G Rocky Flats, Inc., Golden, Colorado. November 1990.

EG&G. 1990b. *Final Background Geochemical Characterization Report for 1989.* EG&G Rocky Flats, Inc., Golden, Colorado. December 21, 990.

EG&G. 1991a. *Well Evaluation Report for the Rocky Flats Plant Well Abandonment and Replacement Program.* EG&G Rocky Flats, Inc., Golden, Colorado. January 1991.

EG&G. 1991b. *Final Groundwater Protection and Monitoring Program Plan.* EG&G Rocky Flats, Inc., Golden, Colorado. November 1991.

EG&G. 1991c. *Phase I Geologic Characterization Report.* Prepared for the U.S. Department of Energy. Rocky Flats Plant. Golden, Colorado. July 1991.

EG&G. 1991d. *General Radiochemistry and Routine Analytical Services Protocol (GRRASP).* EG&G Rocky Flats, Inc., Golden, Colorado. July 1991.

EG&G. 1992a. *Groundwater Protection and Monitoring Program Plan.* EG&G Rocky Flats, Inc., Golden, Colorado. 1992.

EG&G. 1992b. *Phase II Geologic Characterization Data Acquisition Surface Geologic Mapping of the Rocky Flats Plant and Vicinity, Jefferson and Boulder Counties, Colorado.* EG&G Rocky Flats, Inc., Golden, Colorado. March 1992.

EG&G. 1992c. *Background Geochemical Characterization Report for 1991.* EG&G Rocky Flats, Inc., Golden, Colorado. September 26, 1992.

EG&G. 1992d. *1991 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant*. EG&G Rocky Flats, Inc., Golden, Colorado. March 1992.

EG&G. 1992e. *Environmental Management Department Standard Operating Procedures.* EG&G Rocky Flats, Inc., Golden, Colorado. Volumes I-VII. March 1992.

EG&G. 1993a. *Geotechnical Engineering Report for Geotechnical Analysis of Earthen Dams A-3, B-1, B-3, and Landfill Dam.* EG&G Rocky Flats, Inc., Golden, Colorado. January 1993.

EG&G. 1993b. *SWD Field Report Series - 1992.* EG&G Rocky Flats, Inc., Golden, Colorado. June 1993.

EG&G. 1993c. *1992 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant.* EG&G Rocky Flats, Inc., Golden, Colorado. March 1993.

EG&G. 1993d. *Background Geochemical Characterization Report for 1992.* EG&G Rocky Flats, Inc., Golden, Colorado. September 30, 1993.

EG&G. 1993e. *Monthly Water Level Measurement Well Selection.* EG&G Rocky Flats, Inc., Golden, Colorado. July 1993.

ENR (*Engineering News-Record*). 1993. "House Bill Would Put DOE Plants Under Clean Water Act Rules." July 12, 1993. pp. 5.

Fetter, C.W., Jr. 1988. *Applied Hydrogeology.* 2nd Edition. Merrill Publishing Company. Columbus, Ohio.

FR (Federal Register). 1993. *Radiation Protection of the Public and the Environment.* 58 FR 16268. March 25,1993.

Freeze, R.A., and J.A. Cherry. 1979. *Groundwater.* Prentice-Hall. Englewood Cliffs, New Jersey. 604 p.

Jury, W.A. 1985. *Spatial Variability of Soil Physical Parameters in Solute Migration: A Critical Literature Review.* EPRI Report #EA-4228. Palo Alto, California. 89 p.

Klotz, Leon. 1993. EG&G Rocky Flats, Inc. Personal communication.

Knox, R.C., D.A. Sabatini, and L.W. Center. 1993. *Subsurface Transport and Fate Processes.* Lewis Publishers. Boca Raton, Florida. 404 p.

Lindberg, Ralph. 1993. SMS. Personal communication.

Newill, Richard. 1993. Woodward-Clyde Federal Services. Personal communication.

Primrose, Annette. 1993. EG&G Rocky Flats, Inc. Personal communication.

Roberts, Barry. 1993. EG&G Rocky Flats, Inc. Personal communication.

Roy, K.A.. 1993. "Contributions to Superfund Reform Debate Flow Freely at HazMat West' 92". *HazMat World.* January 1993. pp. 8.

Smith, Rob. 1993. EG&G Rocky Flats, Inc. Personal communication.

Stults, R.G. 1993. Hazardous Waste Identification. A Guide to Changing Regulations. *HazMat World.* March, 1993. pp. 55-60.

U.S. DOE (U.S. Department of Energy). 1988. DOE Order 5400.1. *General Environmental Protection Program.*

U.S. DOE. 1989a. DOE Order 5400.3. *Hazardous and Radioactive Mixed Waste Program.*

U.S. DOE. 1989b. DOE Order 5400.4. *Comprehensive Environmental Response, Compensation and Liability Act Requirements.*

U.S. DOE. 1989c. *Ground Water Assessment Plan for Rocky Flats Plant.* Department of Energy, Rocky Flats Plant, Golden, Colorado. September 1989.

U.S. DOE. 1990. *Addendum to Ground Water Assessment Plan.* Department of Energy, Rocky Flats Plant, Golden, Colorado. May 1990.

U.S. DOE. 1991a. *Final Phase II RFI/RI Work Plan (Bedrock) for Rocky Flats Plant: 903 Pad, Mound, and East Trenches (Operable Unit No. 2).* Department of Energy, Rocky Flats Plant, Golden, Colorado. January 1991.

U.S. DOE. 1991b. *Final Phase II RFI/RI Work Plan (Alluvial) for Rocky Flats Plant: 903 Pad, Mound, and East Trenches Areas (Operable Unit No. 2).* Department of Energy, Rocky Flats Plant, Golden, Colorado. Revision 1. February 1991.

U.S. DOE. 1991c. *Final Phase I RFI/RI Work Plan for Rocky Flats Plant: Present Landfill (IHSS 114) and Inactive Hazardous Waste Storage Area (IHSS 203), Operable Unit No. 7.* Department of Energy, Rocky Flats Plant, Golden, Colorado. December 1991.

U.S. DOE. 1992a. *Final Ground Water Assessment Plan.* Department of Energy, Rocky Flats Plant, Golden, Colorado. February 1992.

195

195

U.S. DOE. 1992b. *Phase I RFI/RI Work Plan - Woman Creek Priority Drainage Operable Unit No. 5.* Department of Energy, Rocky Flats Plant, Golden, Colorado. February 1992.

U.S. DOE. 1992c. *Phase I RFI/RI Work Plan for Operable Unit 6 - Walnut Creek Priority Drainage, Manual No. 21100-WP-OU 6.01.* Department of Energy, Rocky Flats Plant, Golden, Colorado. June 1992.

U.S. DOE. 1992d. *Draft Final Phase III RFI/RI Report, Rocky Flats Plant 881 Hillside Area (Operable Unit No. 1)*, Department of Energy, Rocky Flats Plant, Golden, Colorado. October 1992.

U.S. DOE. 1992e. *Final Historical Release Report for the Rocky Flats Plant.* Department of Energy, Rocky Flats Plant, Golden, Colorado. June 1992.

U.S. DOE. 1993. *Final Ground Water Assessment Plan.* Department of Energy, Rocky Flats Plant, Golden, Colorado. 1993.

U.S. EPA (U.S Environmental Protection Agency). 1992. *Estimating Potential of Occurrence of DNAPL at Superfund Sites.* R.S. Kerr Environmental Research Laboratory. Office of Solid Waste and Emergency Response Publication: 9355-4-07FS. January 1992.

WWE (Wright Water Engineers). 1993a. *Well Evaluation Report.* Rocky Flats Plant, Golden, Colorado. August 11, 1993.

WWE. 1993b. *Groundwater Protection Program Review.* Draft Report. Rocky Flats Plant, Golden, Colorado. August 11, 1993.

WWE. 1993c. *Groundwater Program Compliance Report.* Final Report. Rocky Flats Plant, Golden, Colorado. August 11, 1993.

24077

Well Evaluation Report Final

Appendices - Volume I

April 29, 1994

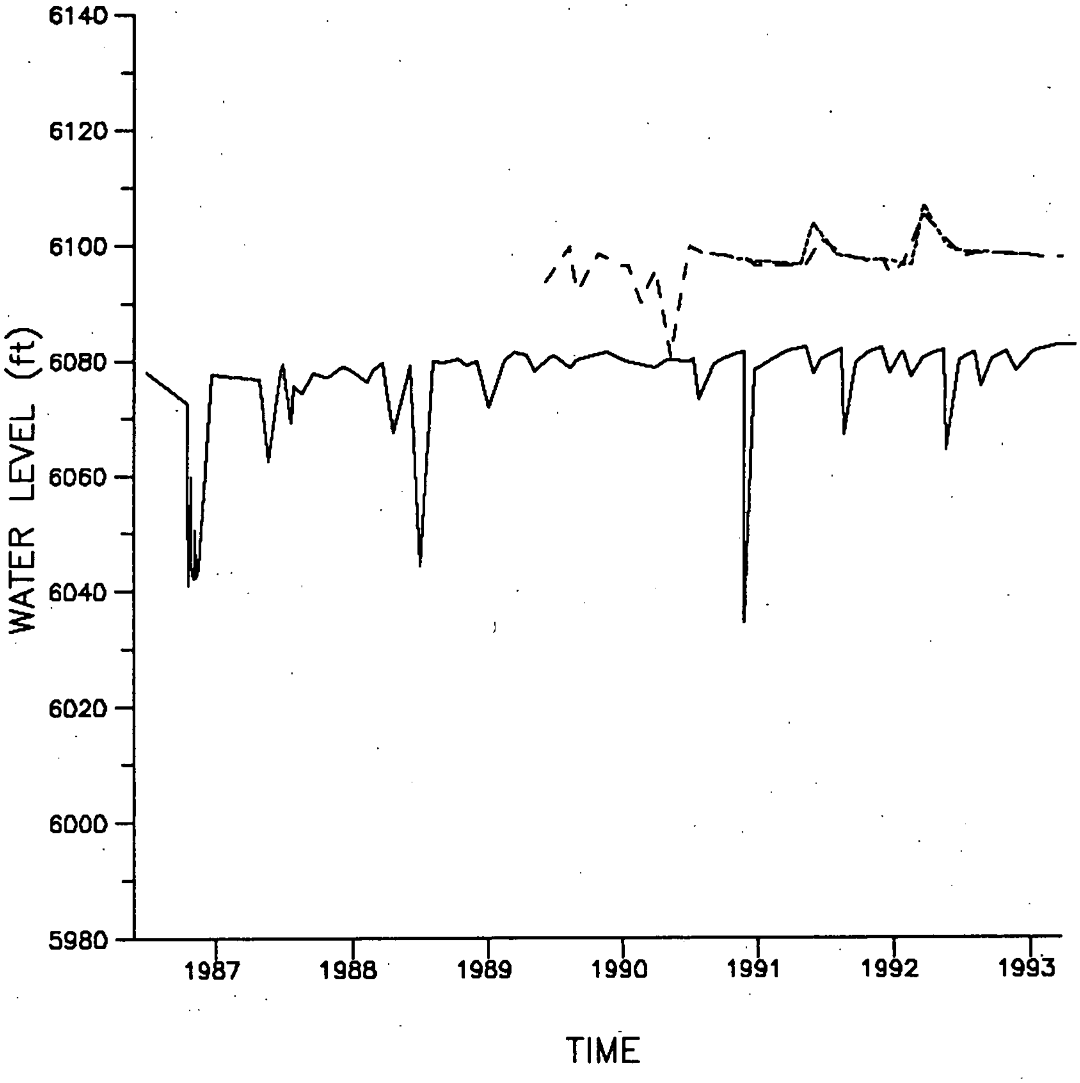
EG&G ROCKY FLATS

EG&G Rocky Flats, Inc.
P.O. Box 464
Golden, Colorado 80402

191

197

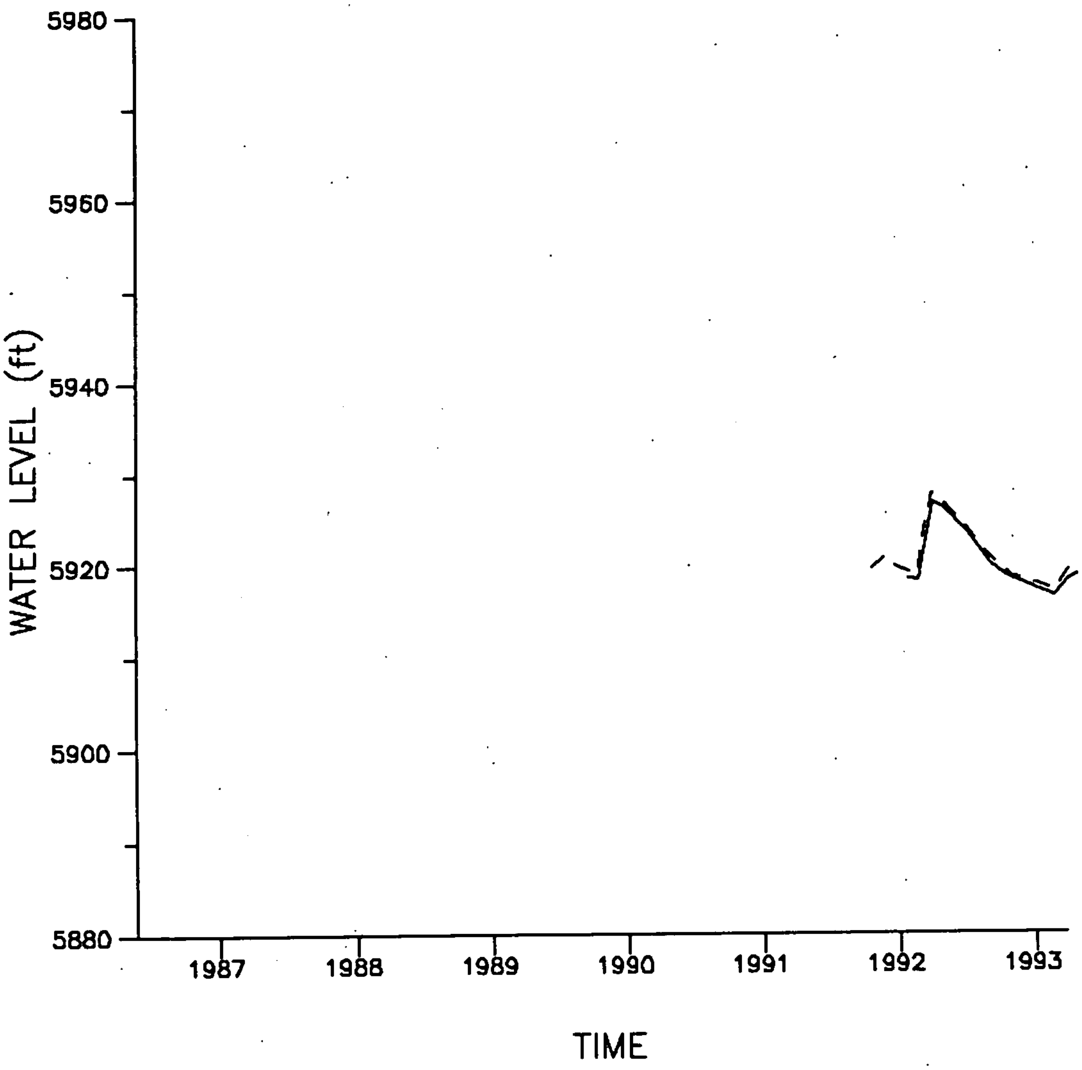
HYDROGRAPH 1



WELL	LITHOLOGY	FILTER PACK (BGS)
------- 5586	ALLUVIUM	(2-36 ft)
——— 5486	BEDROCK	(74-86 ft)
– – B405489	BEDROCK	(38-51 ft)

198

HYDROGRAPH 2

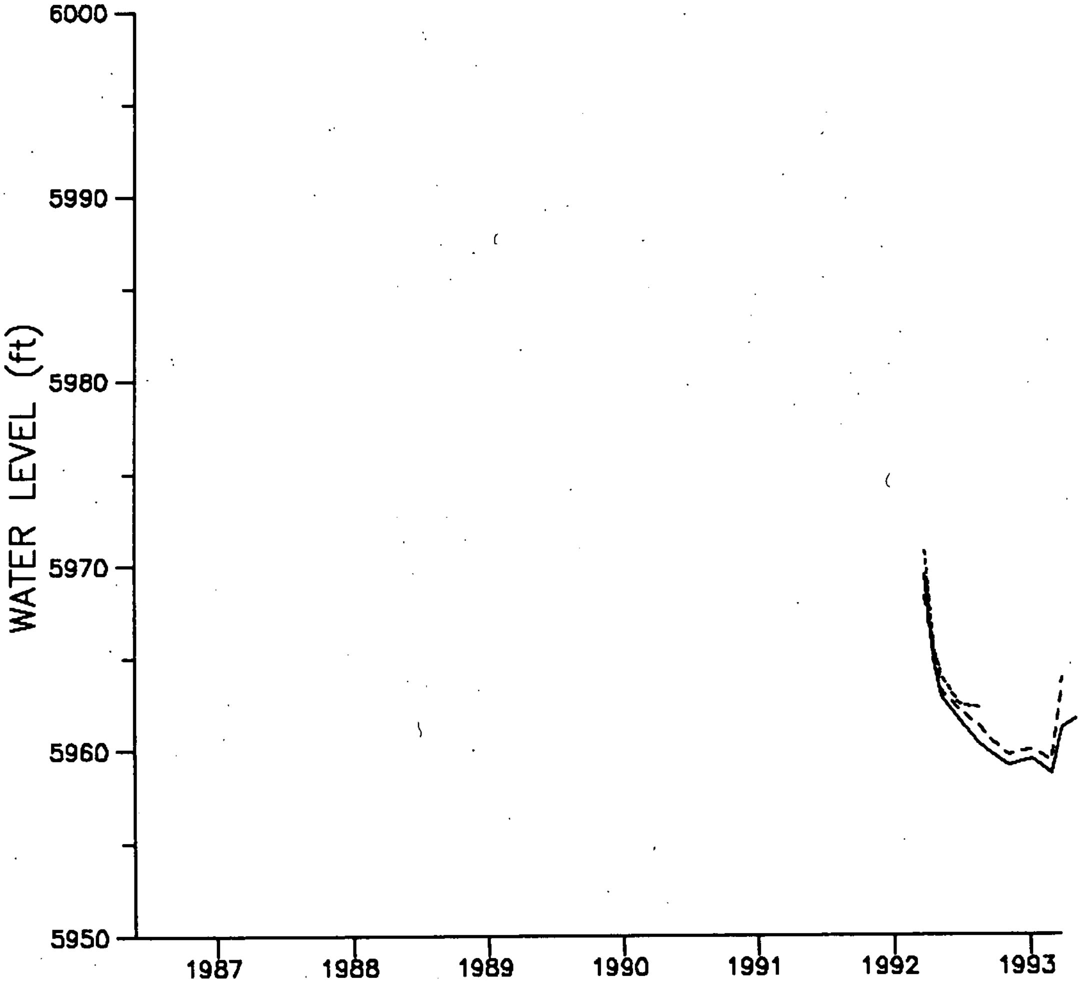


WELL	LITHOLOGY	FILTER PACK (BGS)
– – 05691	ALLUVIUM	(23–35 ft)
—— 12491	BEDROCK	(42–86 ft)

199

193

HYDROGRAPH 3

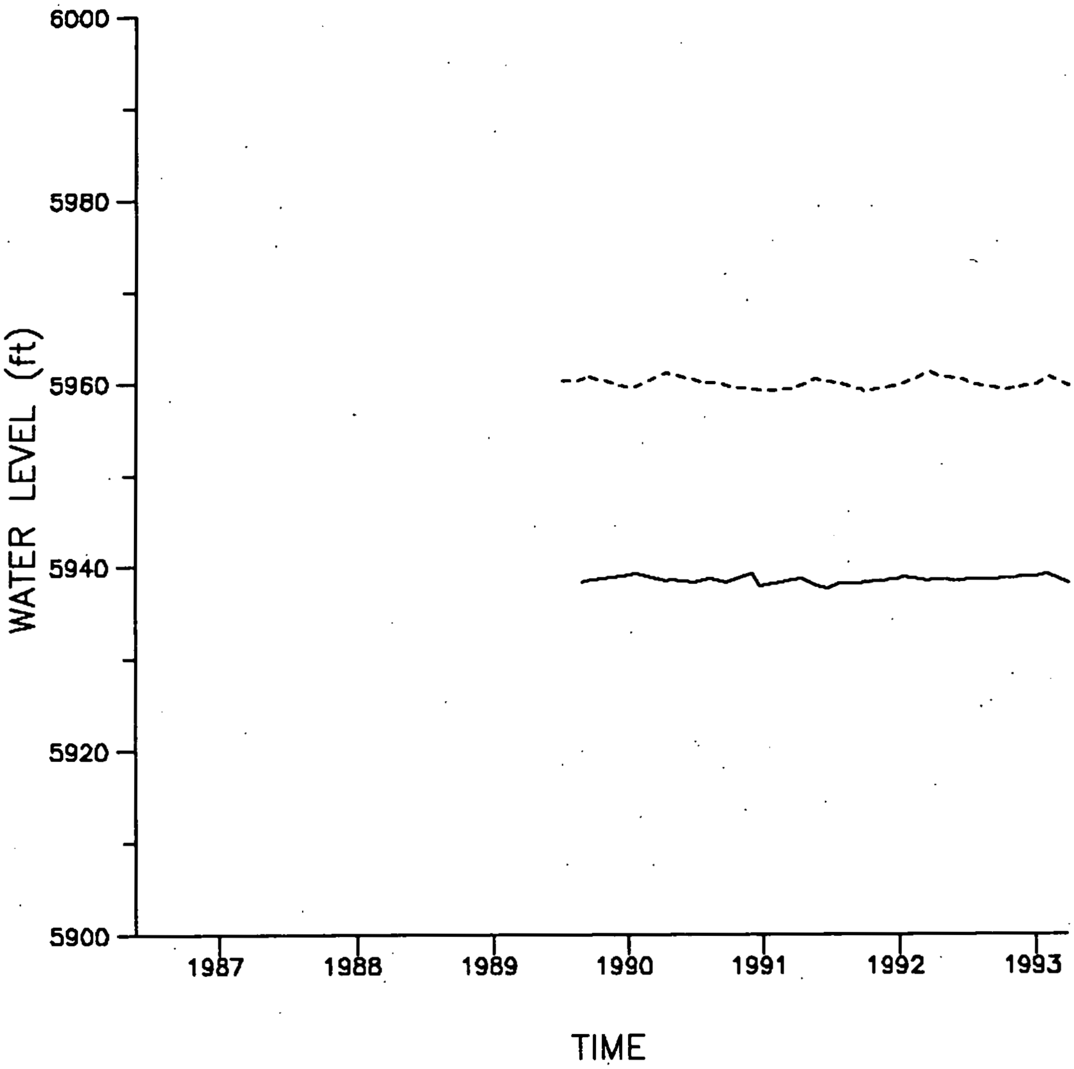


WELL	LITHOLOGY	FILTER PACK (BGS)
13291	ALLUVIUM	(5–16 ft)
13191	BEDROCK	(14–28 ft)
06591	BEDROCK	(29–50 ft)

200

205

HYDROGRAPH 4

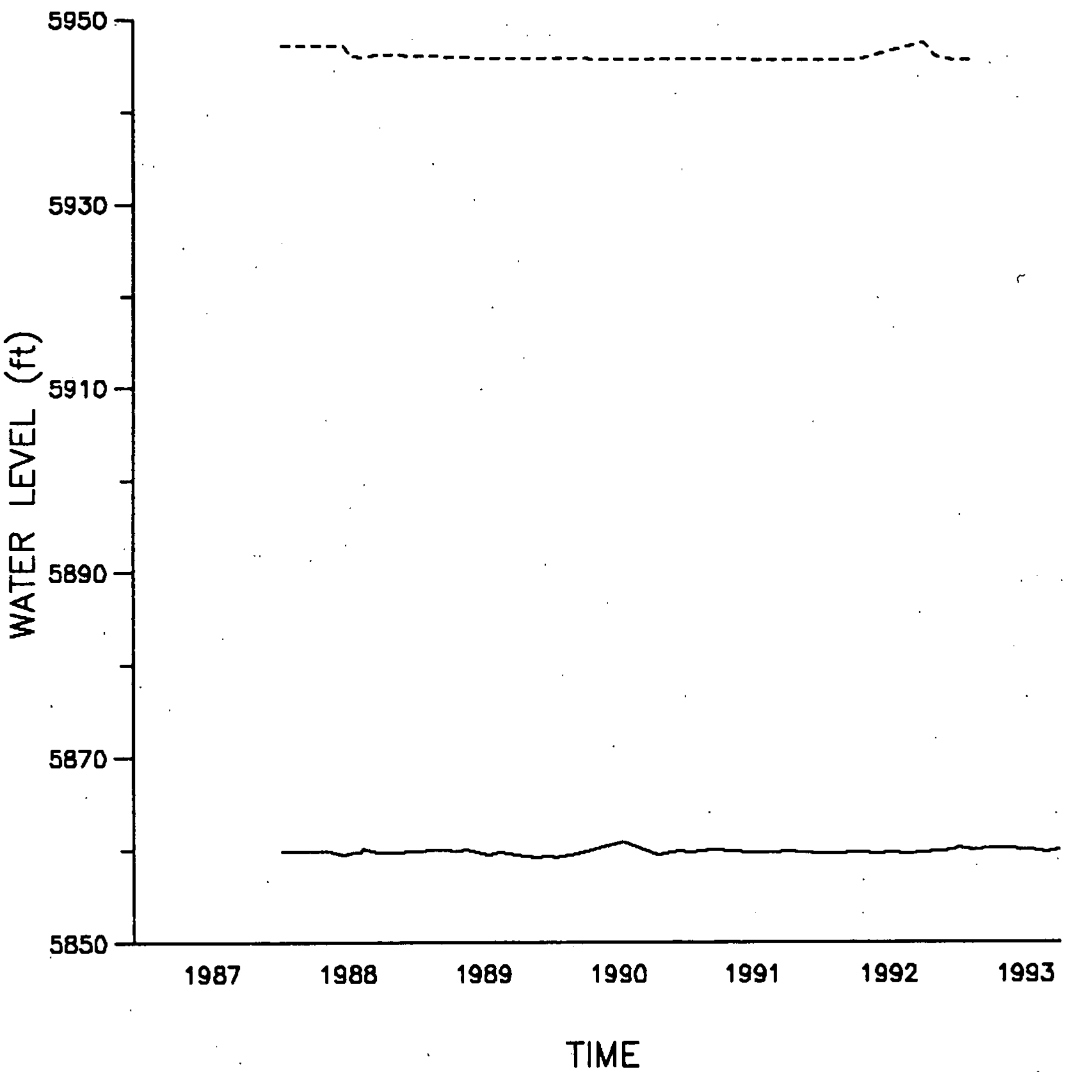


WELL	LITHOLOGY	FILTER PACK (BGS)
---- P207689	ALLUVIUM	(3–14 ft)
—— P207789	BEDROCK	(17–29 ft)

201

~~201~~

HYDROGRAPH 5

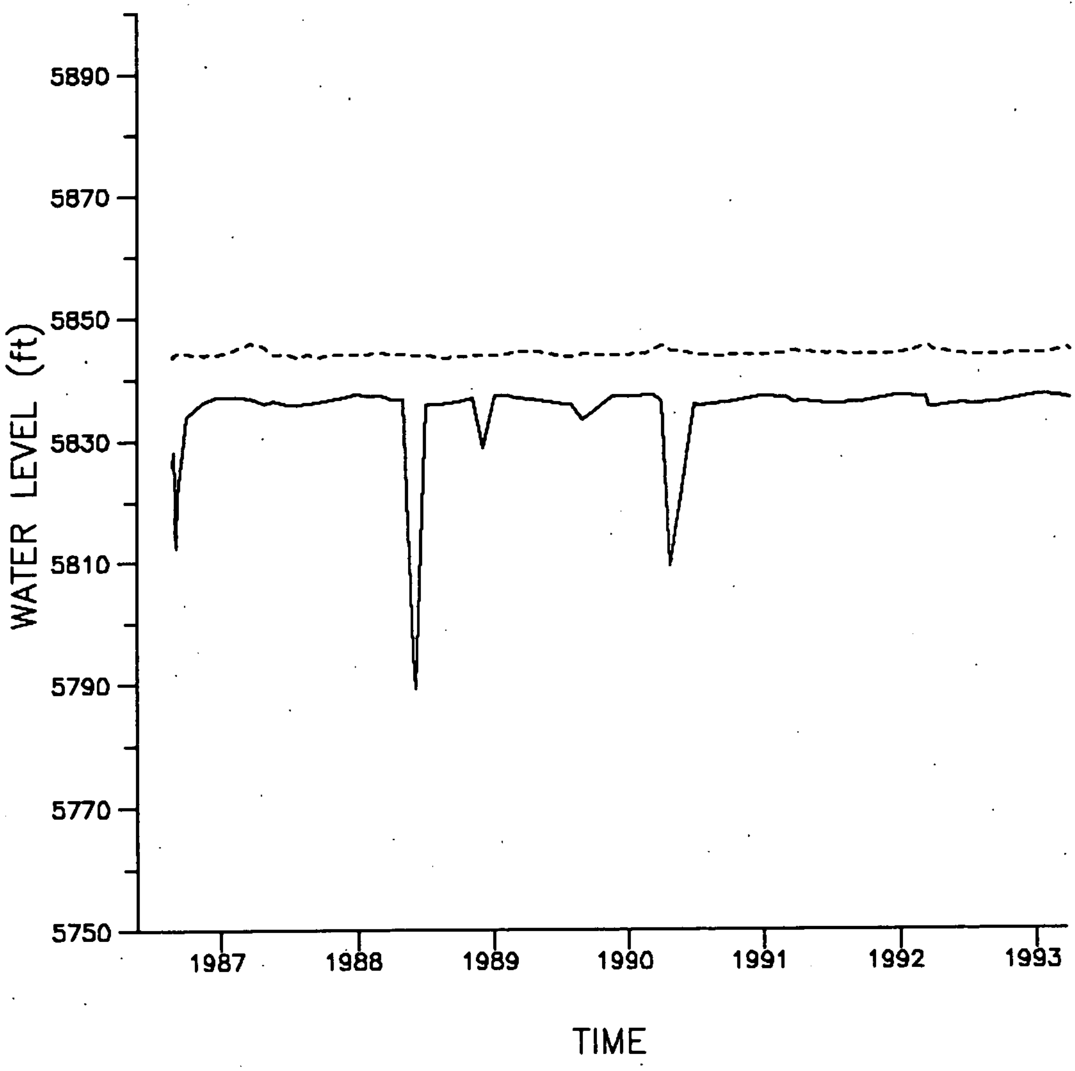


WELL	LITHOLOGY	FILTER PACK (BGS)
---- 4487	ALLUVIUM	(1-4 ft)
—— 4587	BEDROCK	(88-101 ft)

202

202

HYDROGRAPH 6

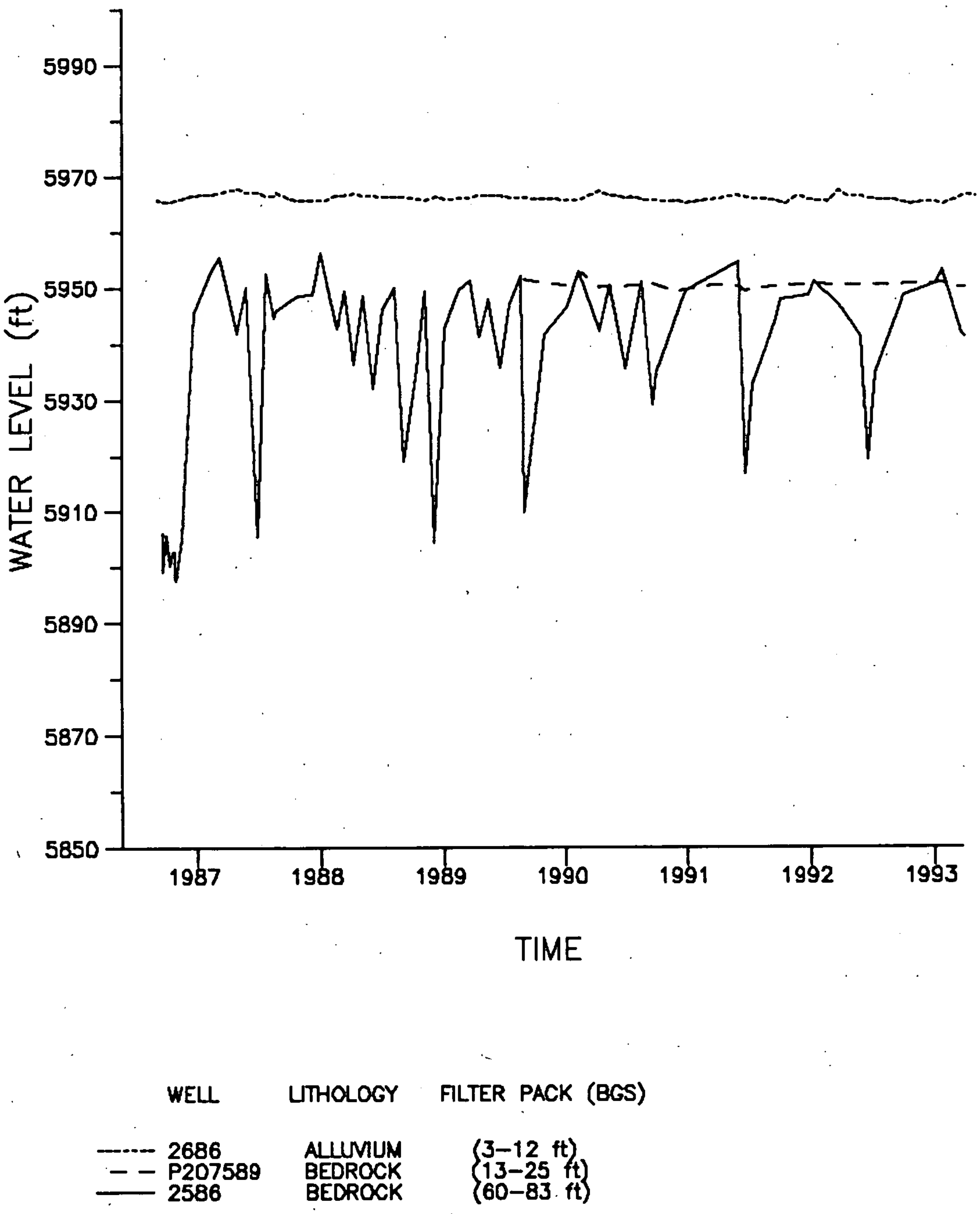


WELL	LITHOLOGY	FILTER PACK (BGS)
---- 1586	ALLUVIUM	(3–18 ft)
—— 1486	BEDROCK	(38–57 ft)

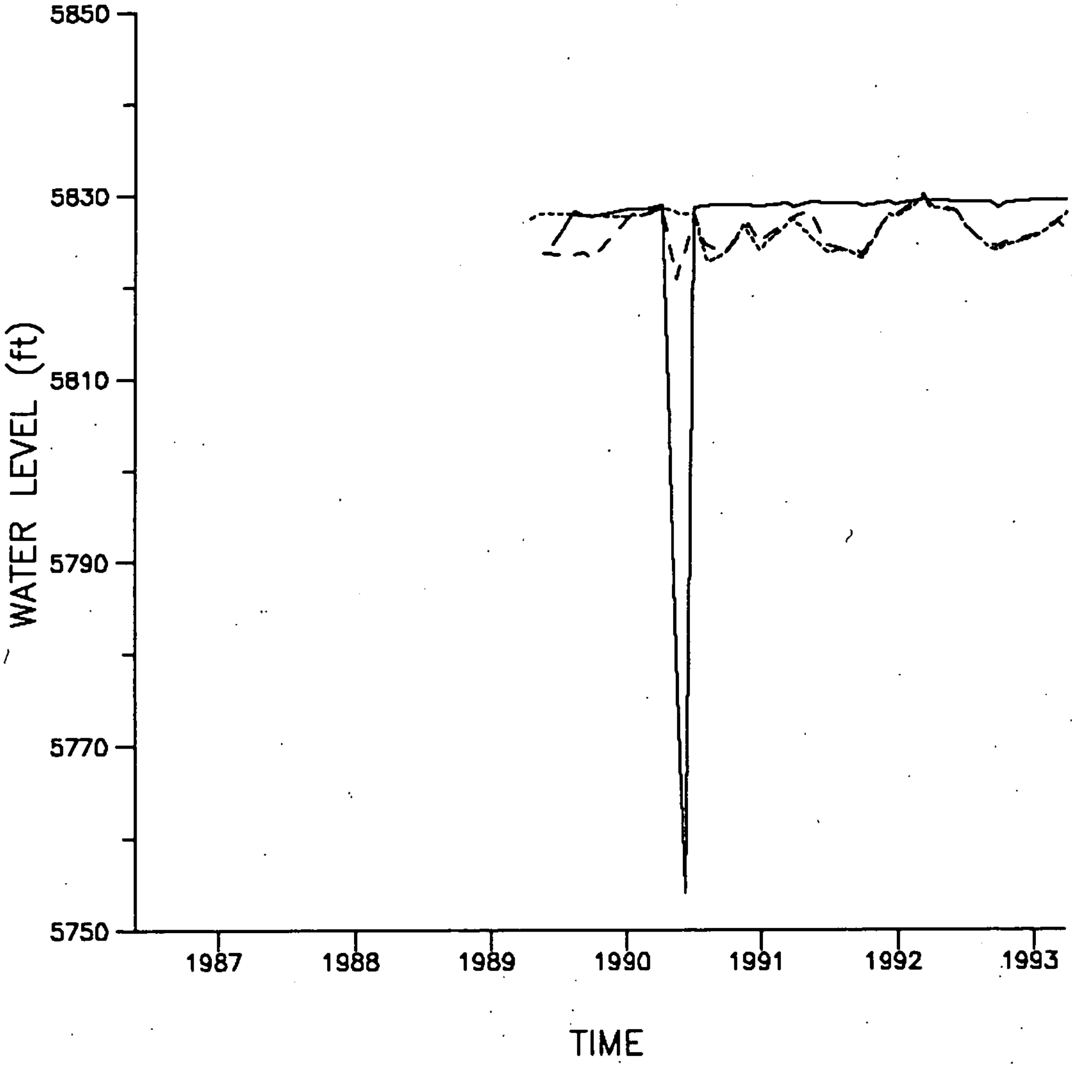
203

203

HYDROGRAPH 7



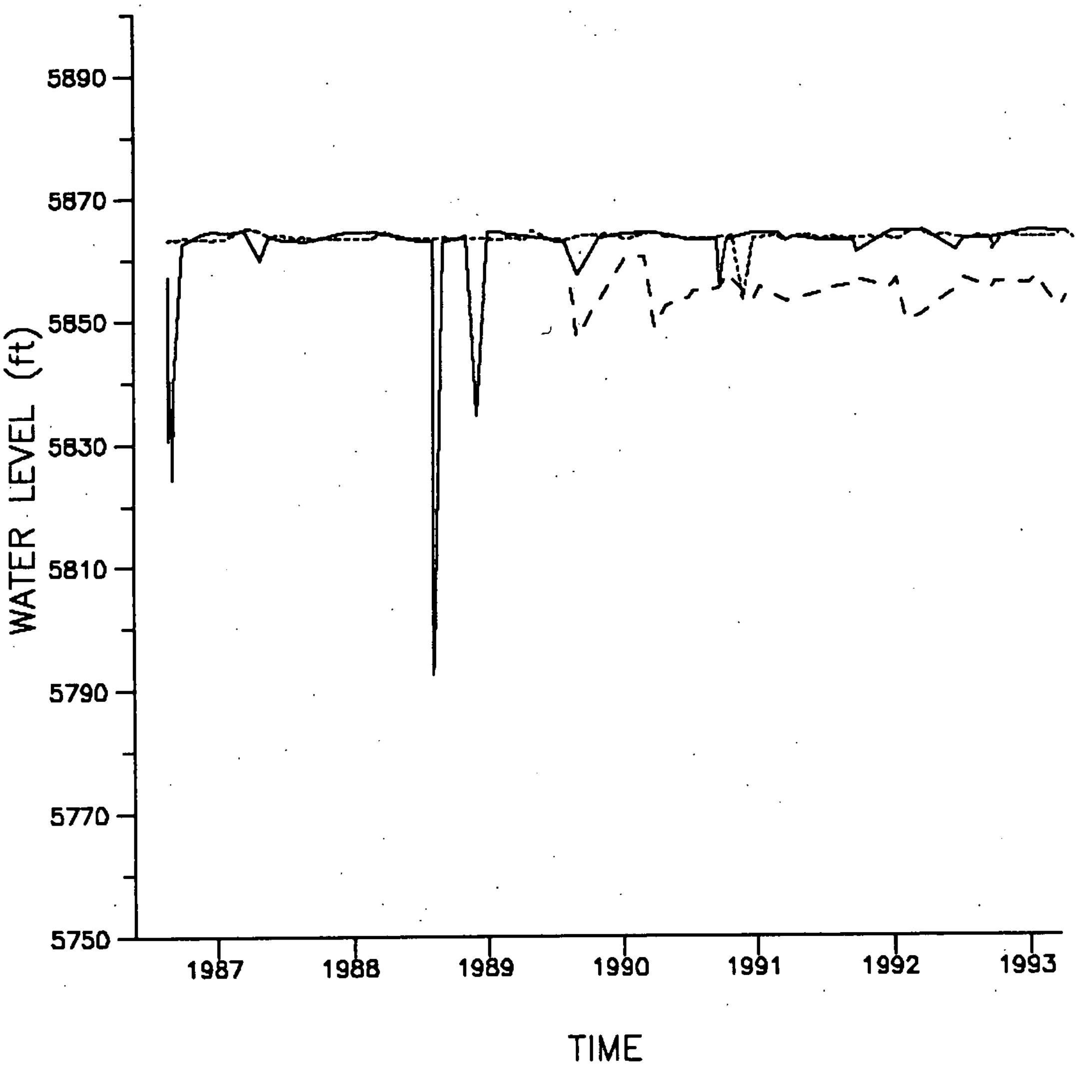
HYDROGRAPH 8



WELL	LITHOLOGY	FILTER PACK (BGS)
------ B302789	ALLUVIUM	(3–10 ft)
– – B305389	BEDROCK	(14–27 ft)
—— B304289	BEDROCK	(83–91 ft)

205

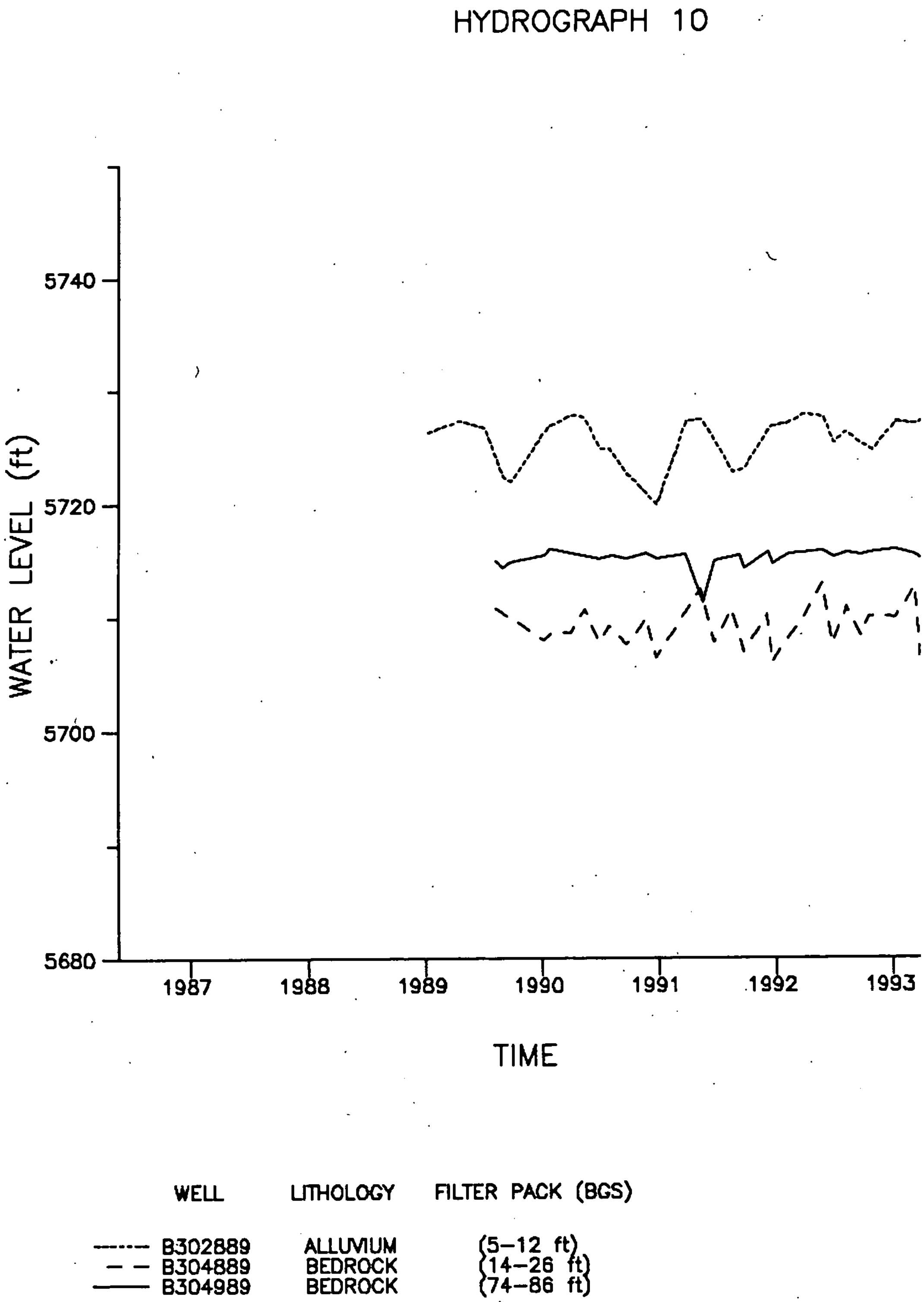
HYDROGRAPH 9



WELL	LITHOLOGY	FILTER PACK (BGS)
1786	ALLUVIUM	(3–14 ft)
B208689	BEDROCK	(11–23 ft)
1686	BEDROCK	(38–45 ft)

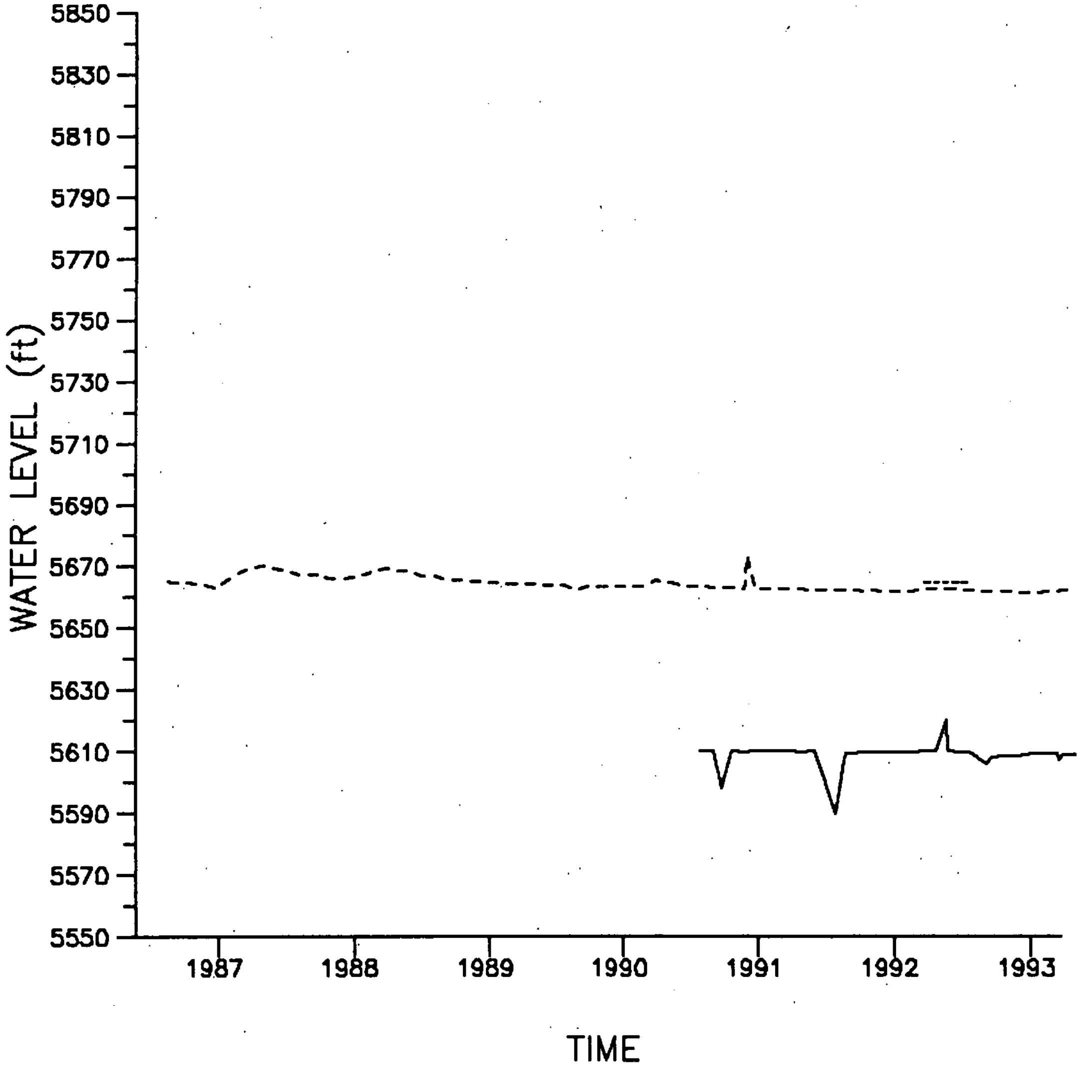
206

~~206~~


HYDROGRAPH 10
WATER LEVEL (ft)
5740
5720
5700
5680
1987
1988
1989
1990
1991
1992
1993
TIME
WELL
LITHOLOGY
FILTER PACK (BGS)
B302889
ALLUVIUM
(5–12 ft)
B304889
BEDROCK
(14–26 ft)
B304989
BEDROCK
(74–86 ft)

207

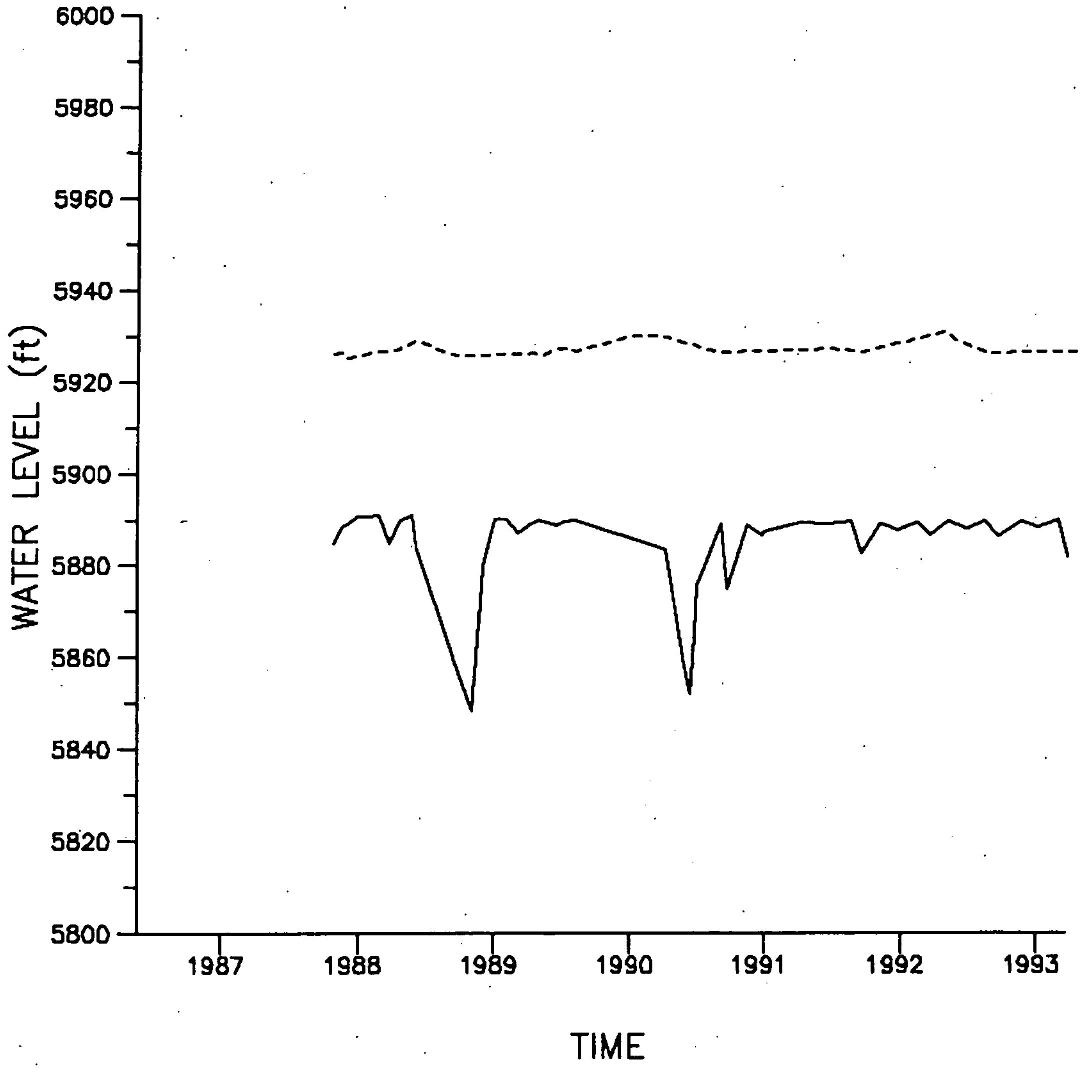
HYDROGRAPH 11



WELL	LITHOLOGY	FILTER PACK (BGS)
40491	ALLUVIUM	(6–10 ft)
0386	BEDROCK	(9–24 ft)
B217289	BEDROCK	(108–146 ft)

208

HYDROGRAPH 12

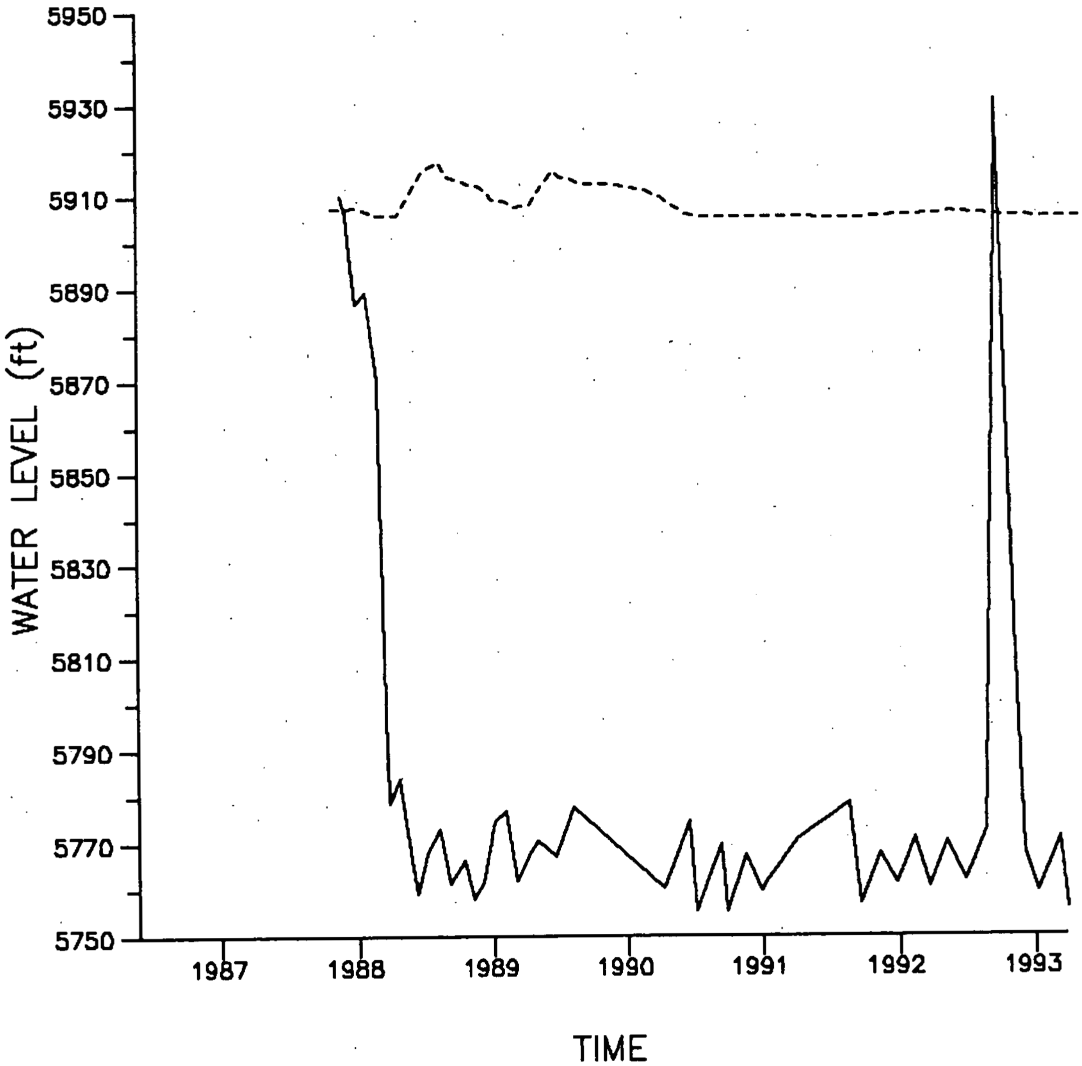


WELL	LITHOLOGY	FILTER PACK (BGS)
---- 3387	ALLUVIUM	(14-20 ft)
—— 3487	BEDROCK	(96-105 ft)

209

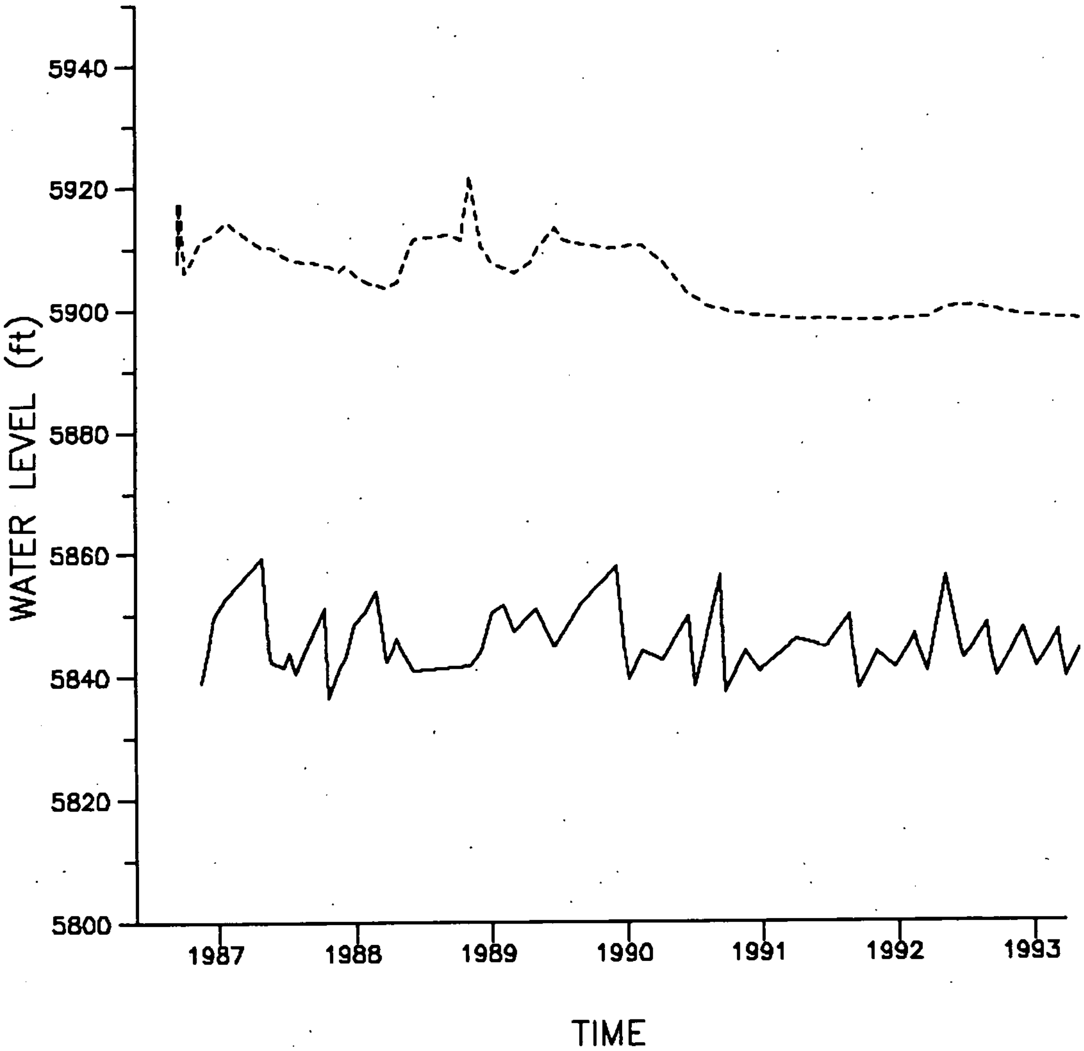
204

HYDROGRAPH 13



WELL	LITHOLOGY	FILTER PACK (BGS)
---- 2787	ALLUVIUM	(3–43 ft)
—— 2887	BEDROCK	(185–198 ft)

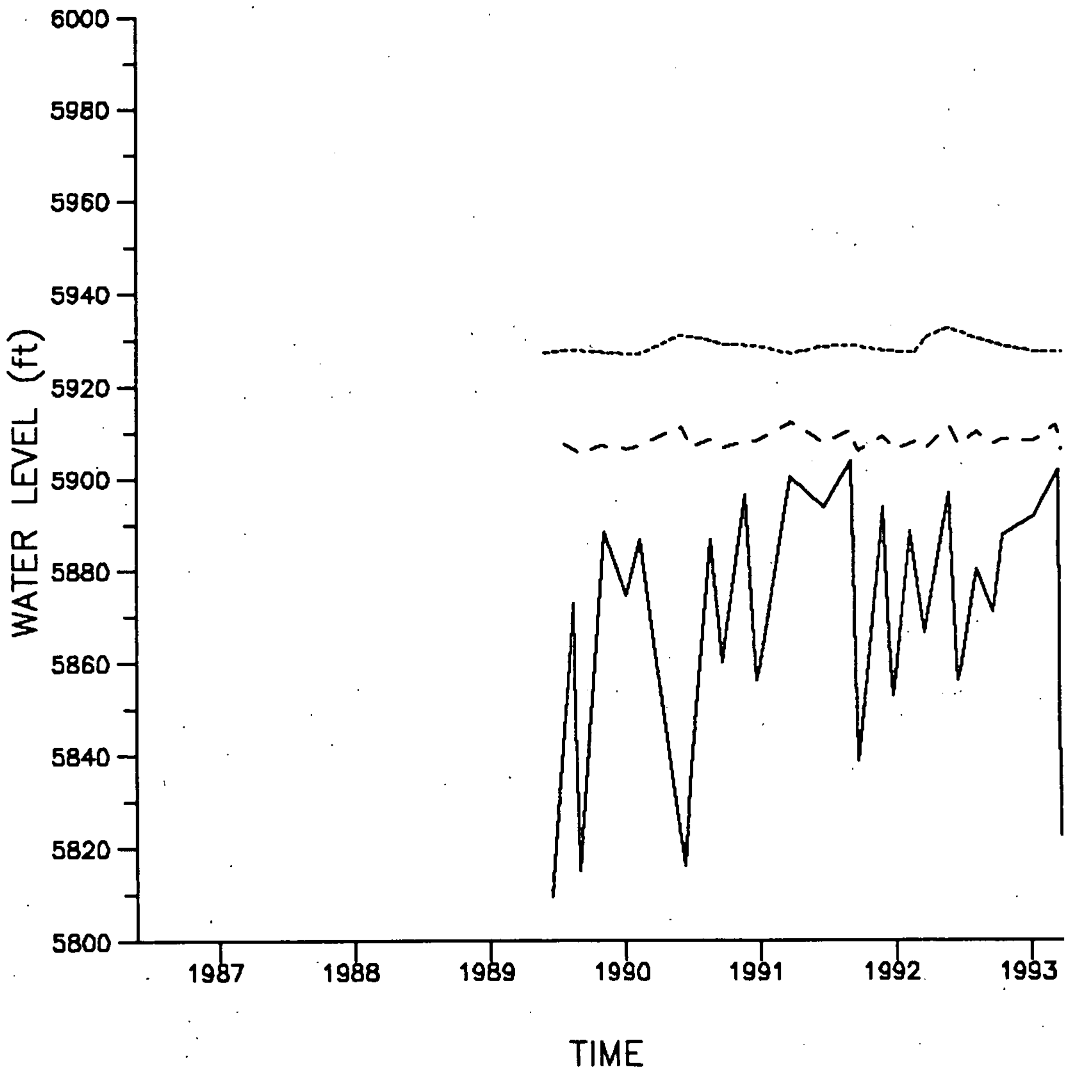
HYDROGRAPH 14



WELL	LITHOLOGY	FILTER PACK (BGS)
---- 4186	ALLUVIUM	(3–45 ft)
—— 4086	BEDROCK	(87–112 ft)

211

HYDROGRAPH 15

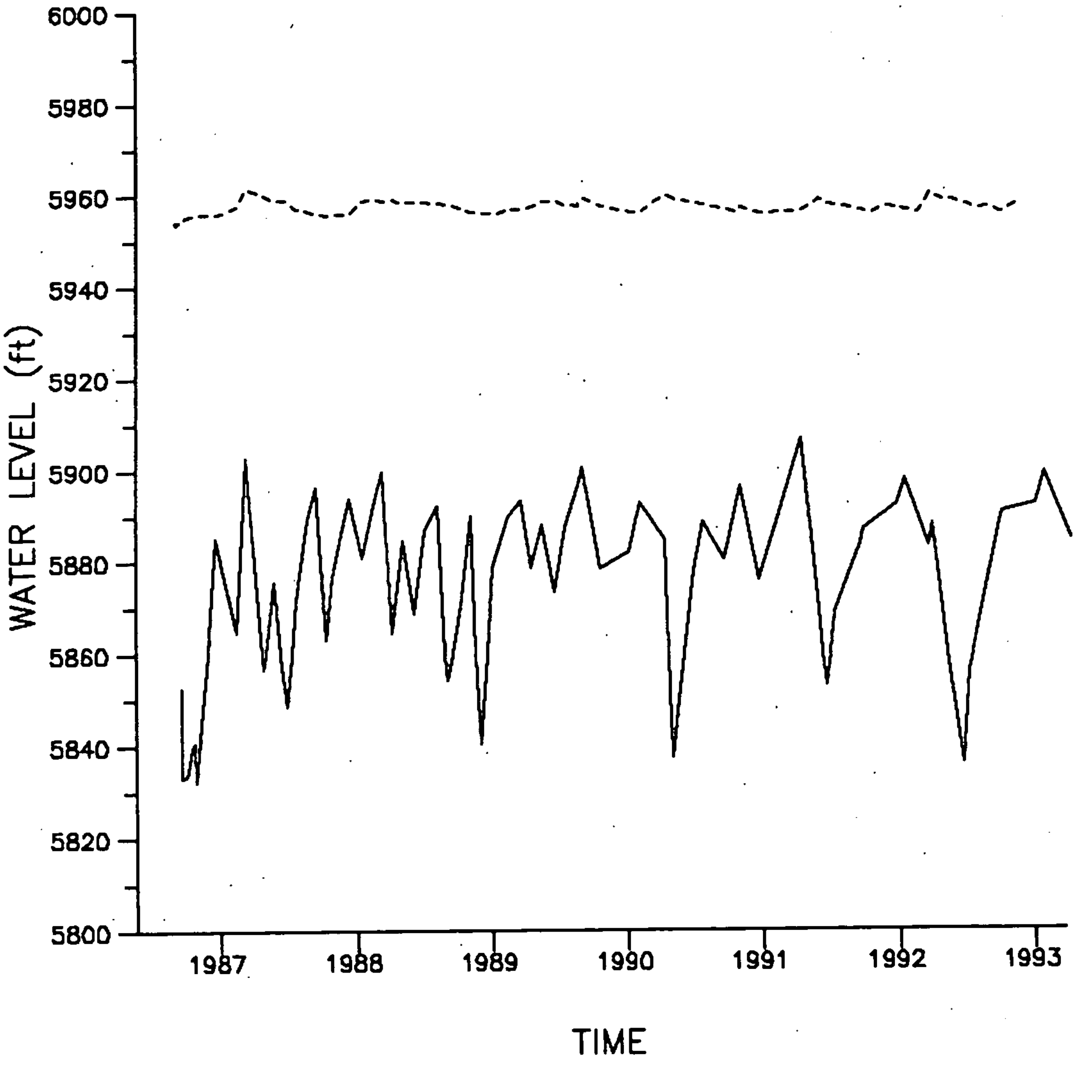


WELL	LITHOLOGY	FILTER PACK (BGS)
B200789	ALLUVIUM	(8–34 ft)
B203489	BEDROCK	(30–41 ft)
B203789	BEDROCK	(133–141 ft)

212

~~212~~

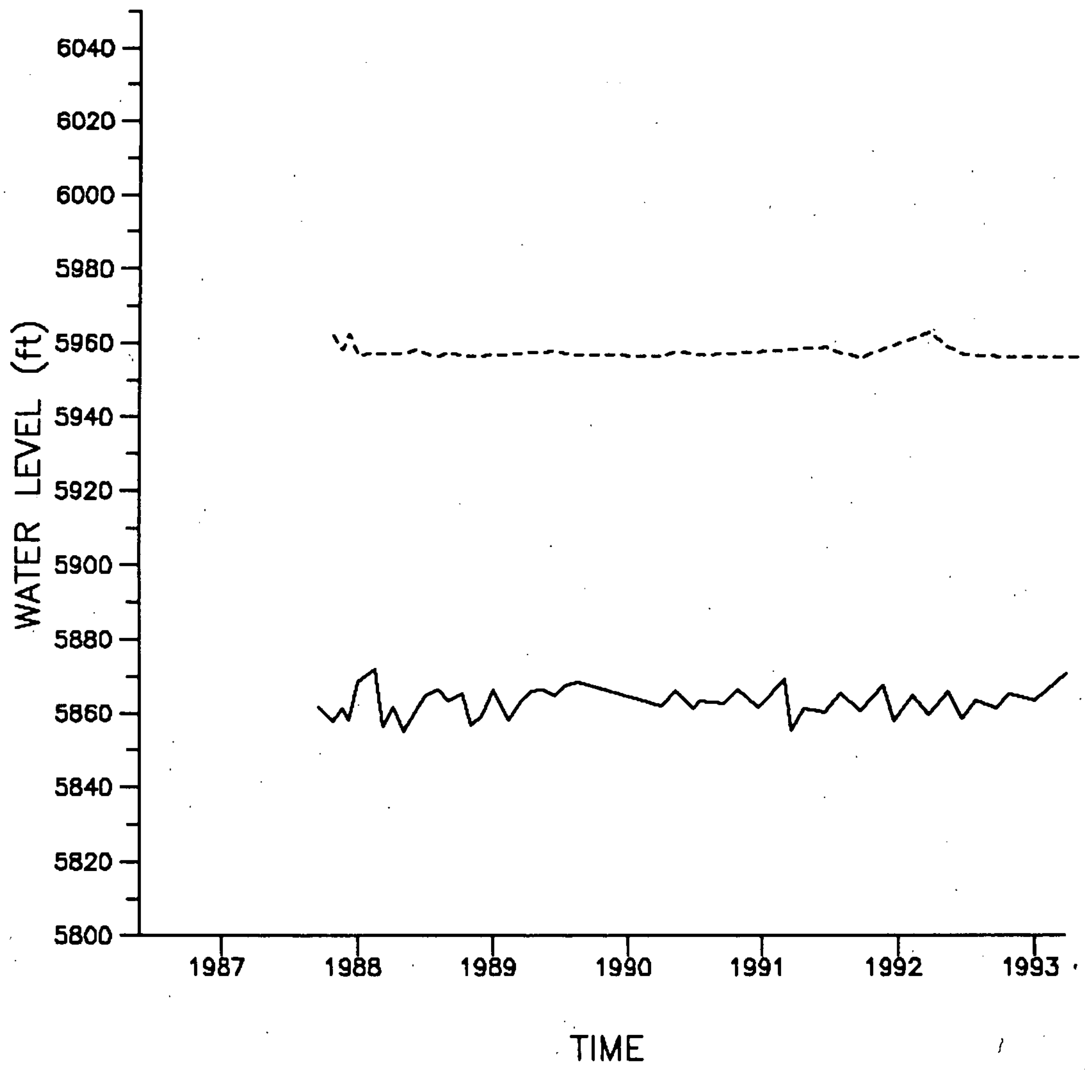
HYDROGRAPH 16



WELL	LITHOLOGY	FILTER PACK (BGS)
---- 2886	ALLUVIUM	(3–10 ft)
—— 2786	BEDROCK	(127–136 ft)

213

HYDROGRAPH 17

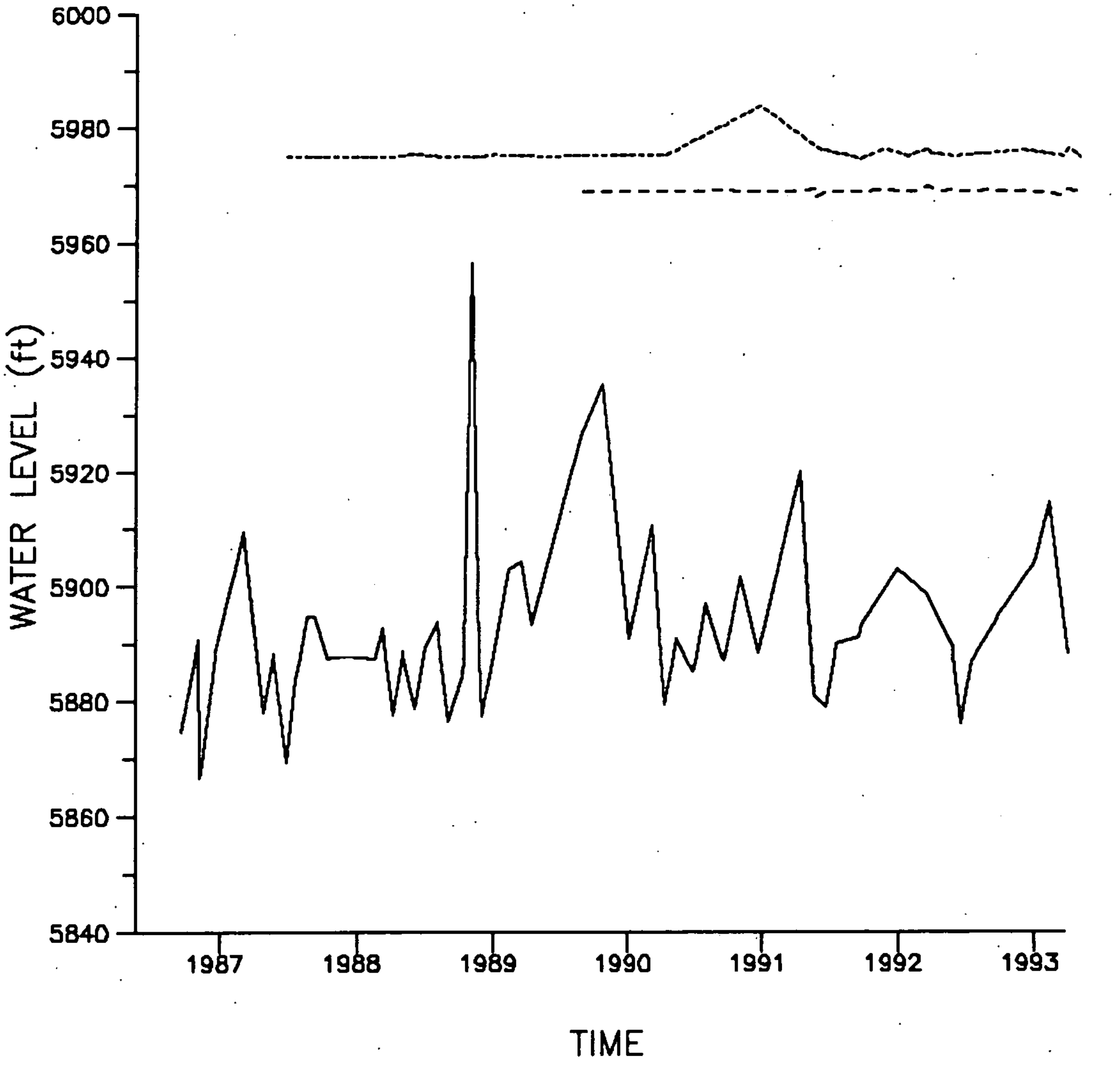


WELL	LITHOLOGY	FILTER PACK (BGS)
---- 1987	ALLUVIUM	(3-12 ft)
—— 2087	BEDROCK	(106-117 ft)

214

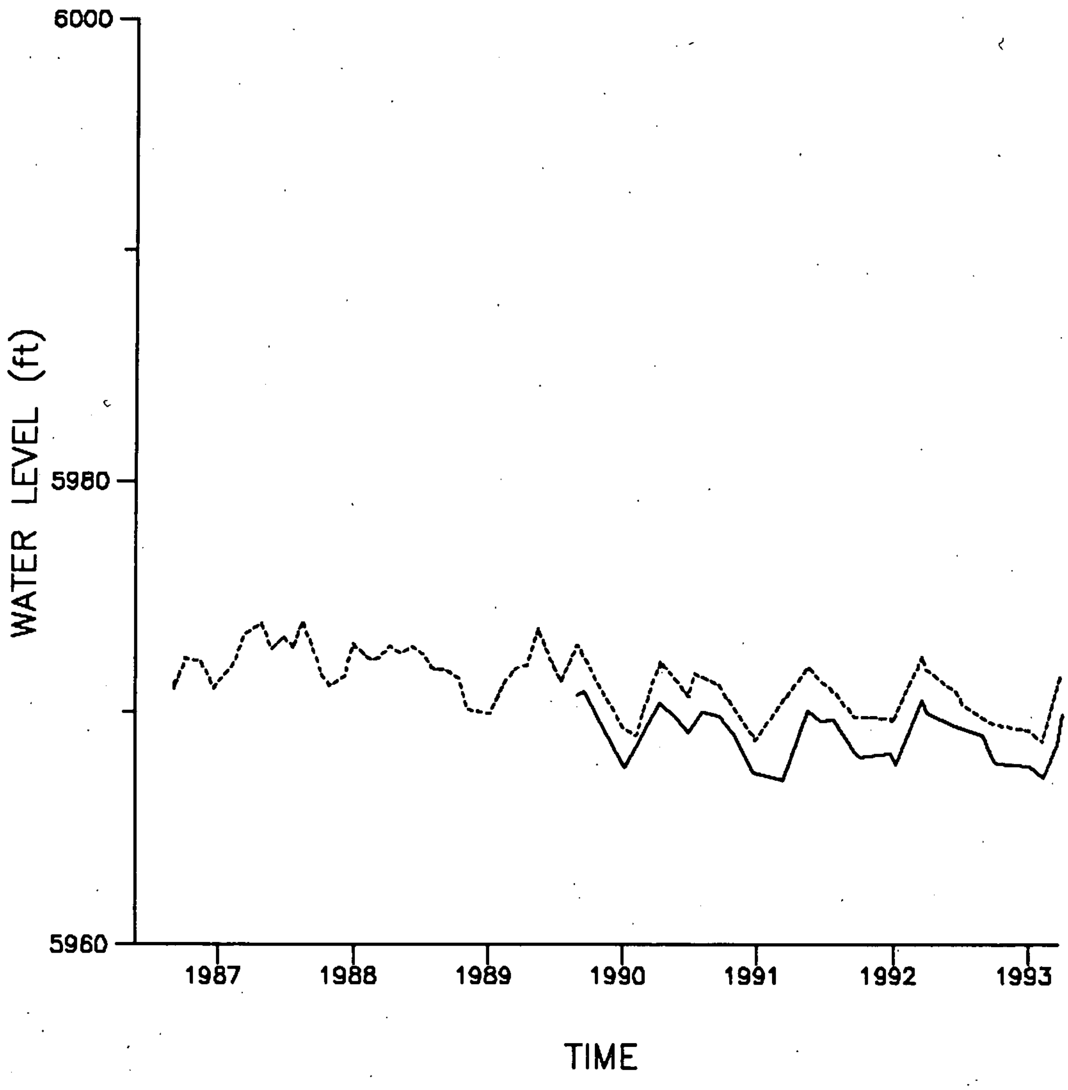
214

HYDROGRAPH 18



WELL	LITHOLOGY	FILTER PACK (BGS)
------ 2486	ALLUVIUM	(2-8 ft)
- - - - P209289	ALLUVIUM	(7-13 ft)
——— 2386	BEDROCK	(112-117)

HYDROGRAPH 19

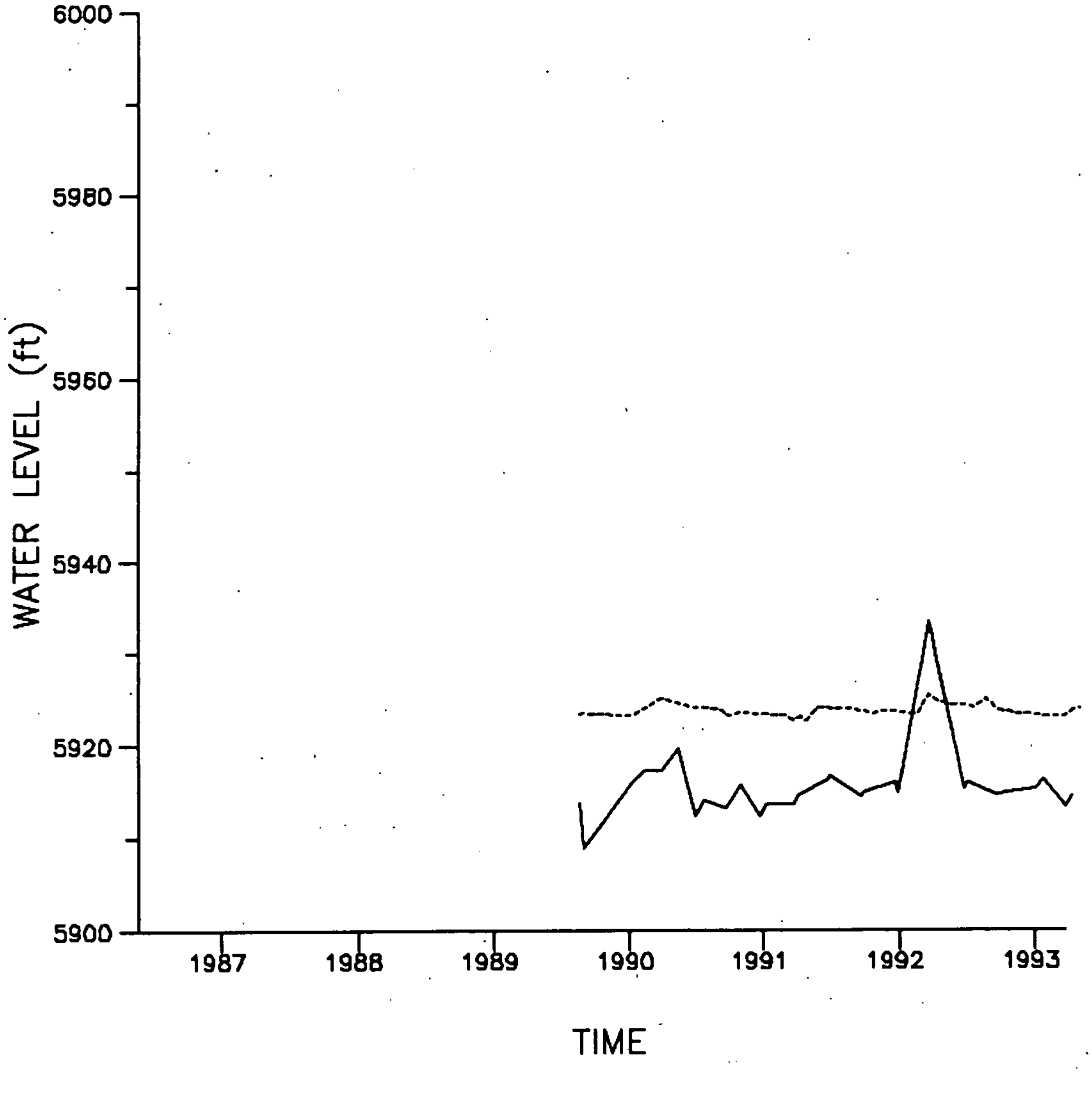


WELL	LITHOLOGY	FILTER PACK (BGS)
------ 2286	ALLUVIUM	(2–11 ft)
—— P210189	BEDROCK	(19–37 ft)

216

216

HYDROGRAPH 20

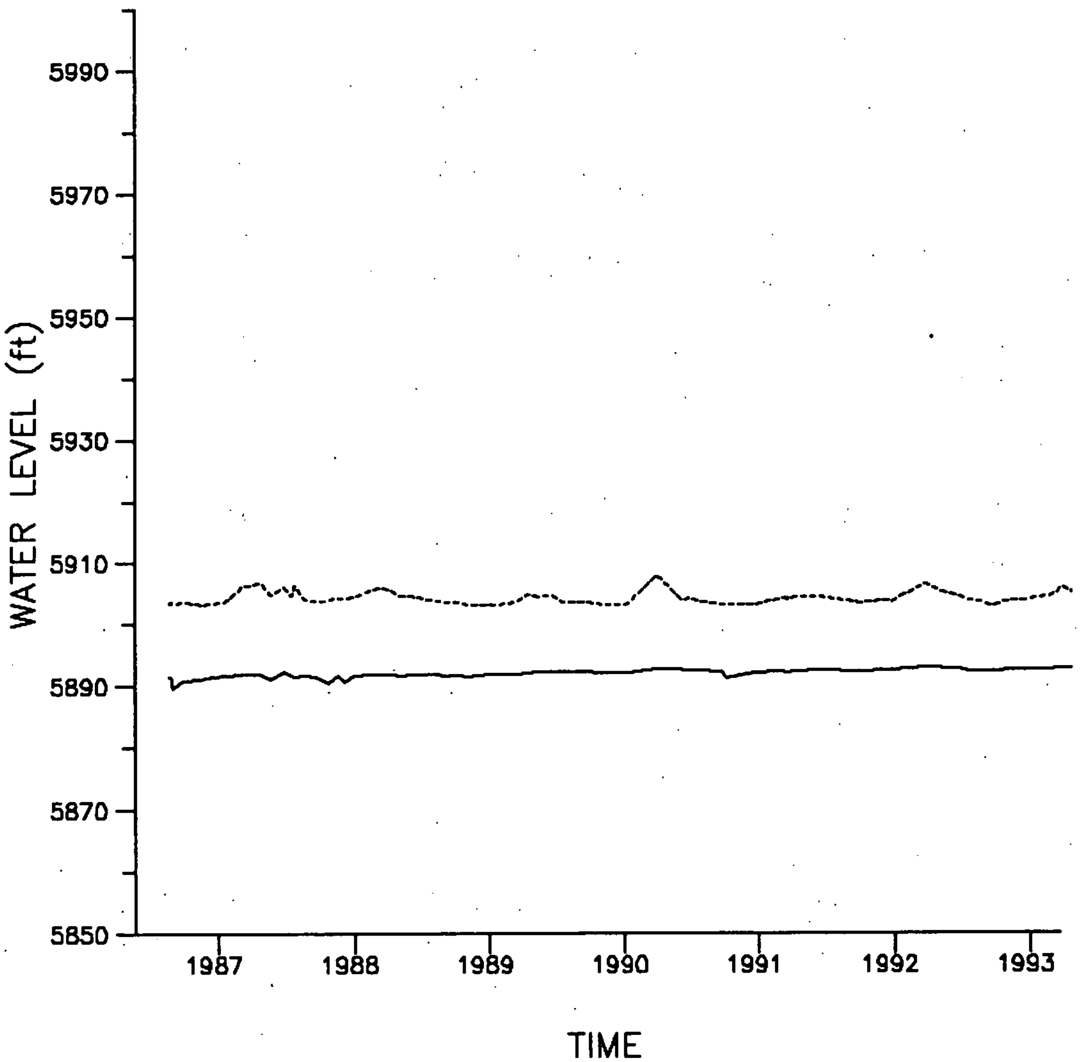


WELL	LITHOLOGY	FILTER PACK (BGS)
------- B208089	ALLUVIUM	(3–14 ft)
——— B208189	BEDROCK	(16–28 ft)

217

217

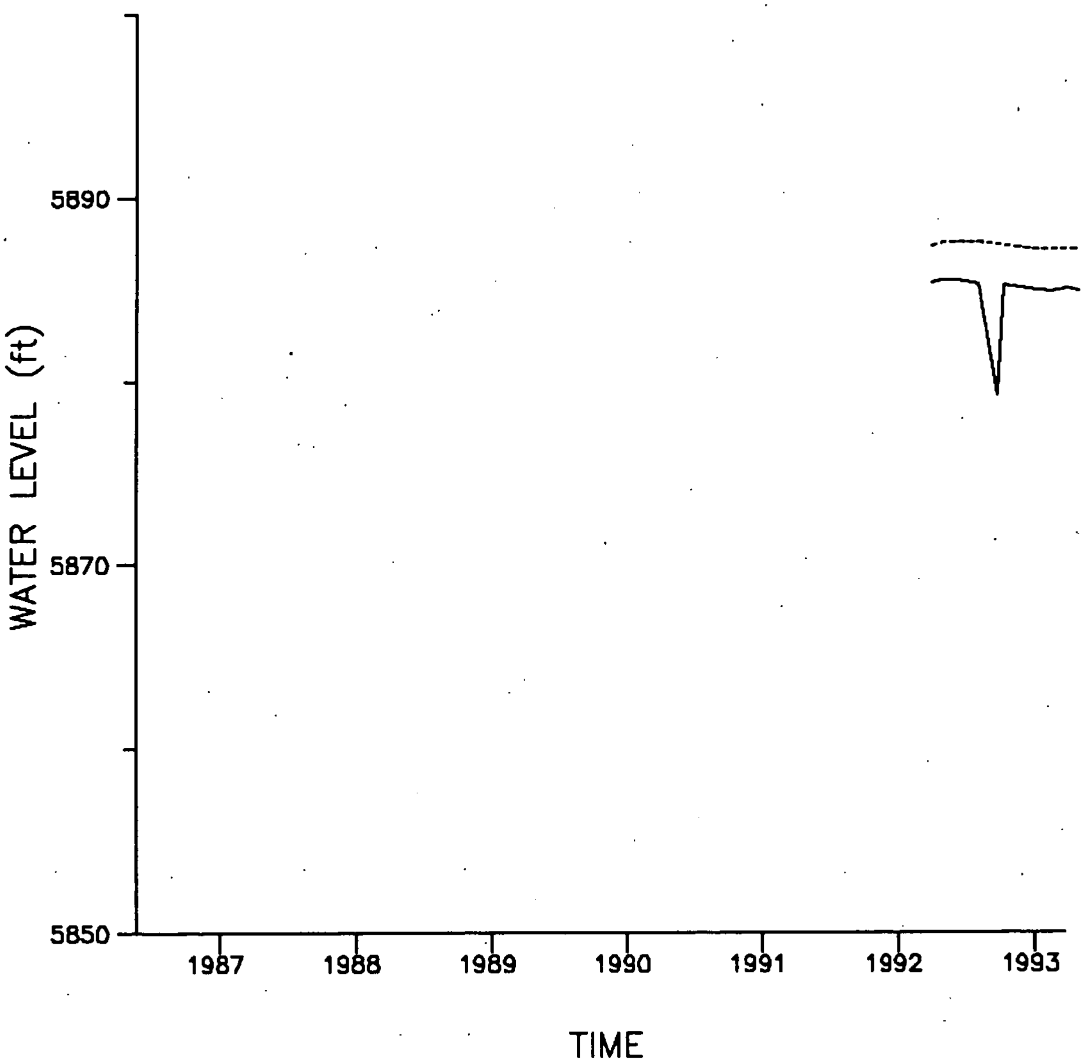
HYDROGRAPH 21



WELL	LITHOLOGY	FILTER PACK (BGS)
------ 3586	ALLUVIUM	(3-13 ft)
—— 3486	BEDROCK	(43-56 ft)

218

HYDROGRAPH 22

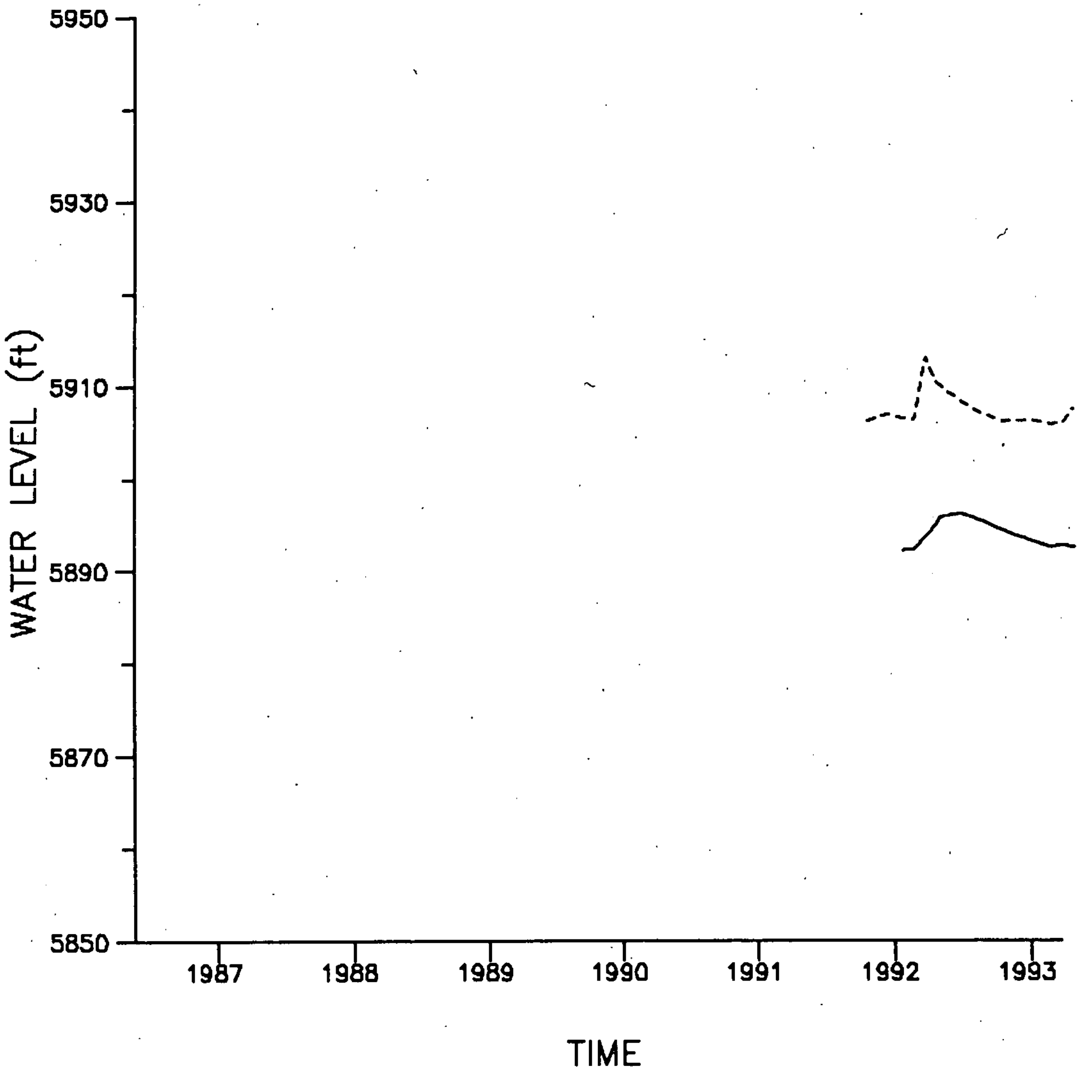


	WELL	LITHOLOGY	FILTER PACK (BGS)
------	13391	ALLUVIUM	(26–39 ft)
——	02591	BEDROCK	(41–50 ft)

219

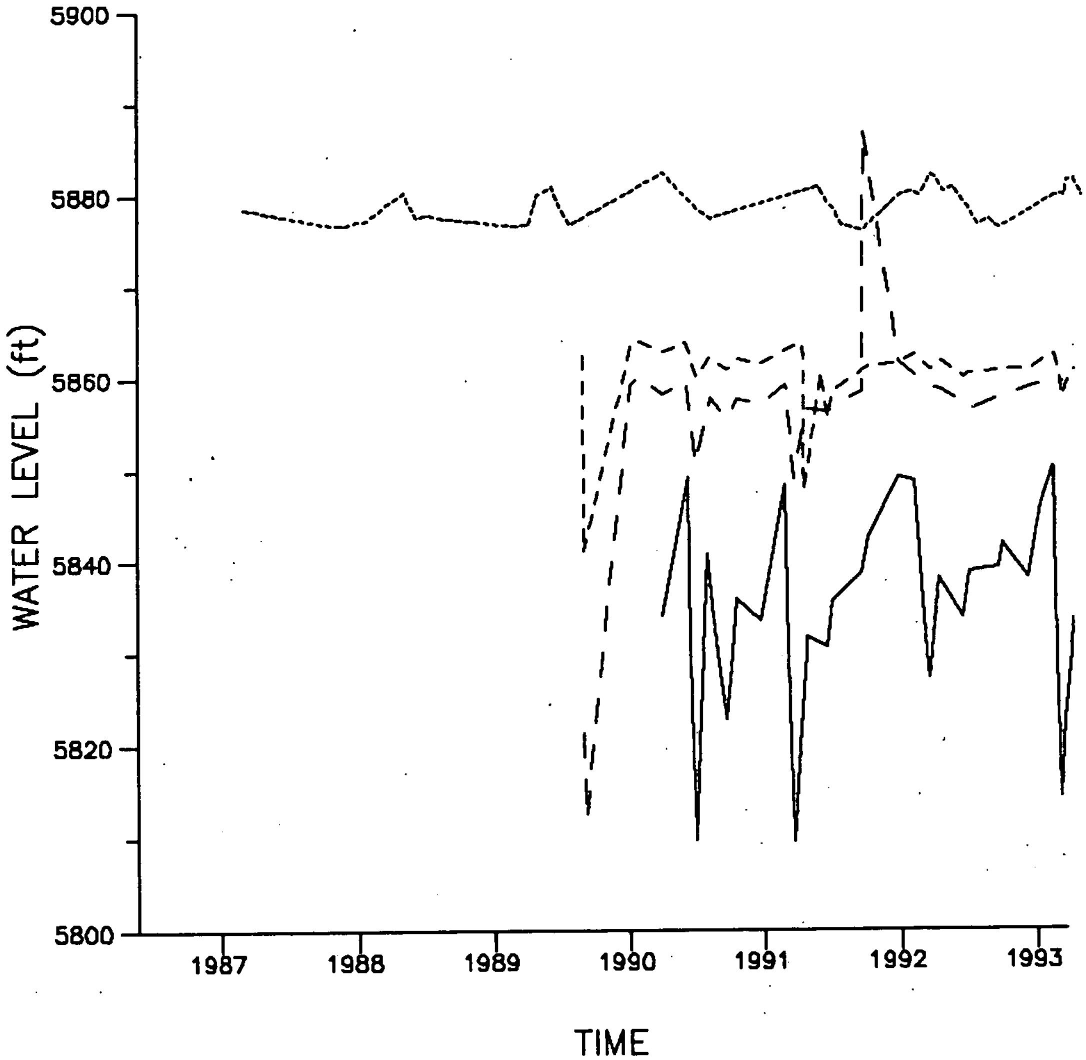
279

HYDROGRAPH 23



WELL	LITHOLOGY	FILTER PACK (BGS)
---- 05391	ALLUVIUM	(22–35 ft)
—— 12391	BEDROCK	(56–69 ft)

HYDROGRAPH 24

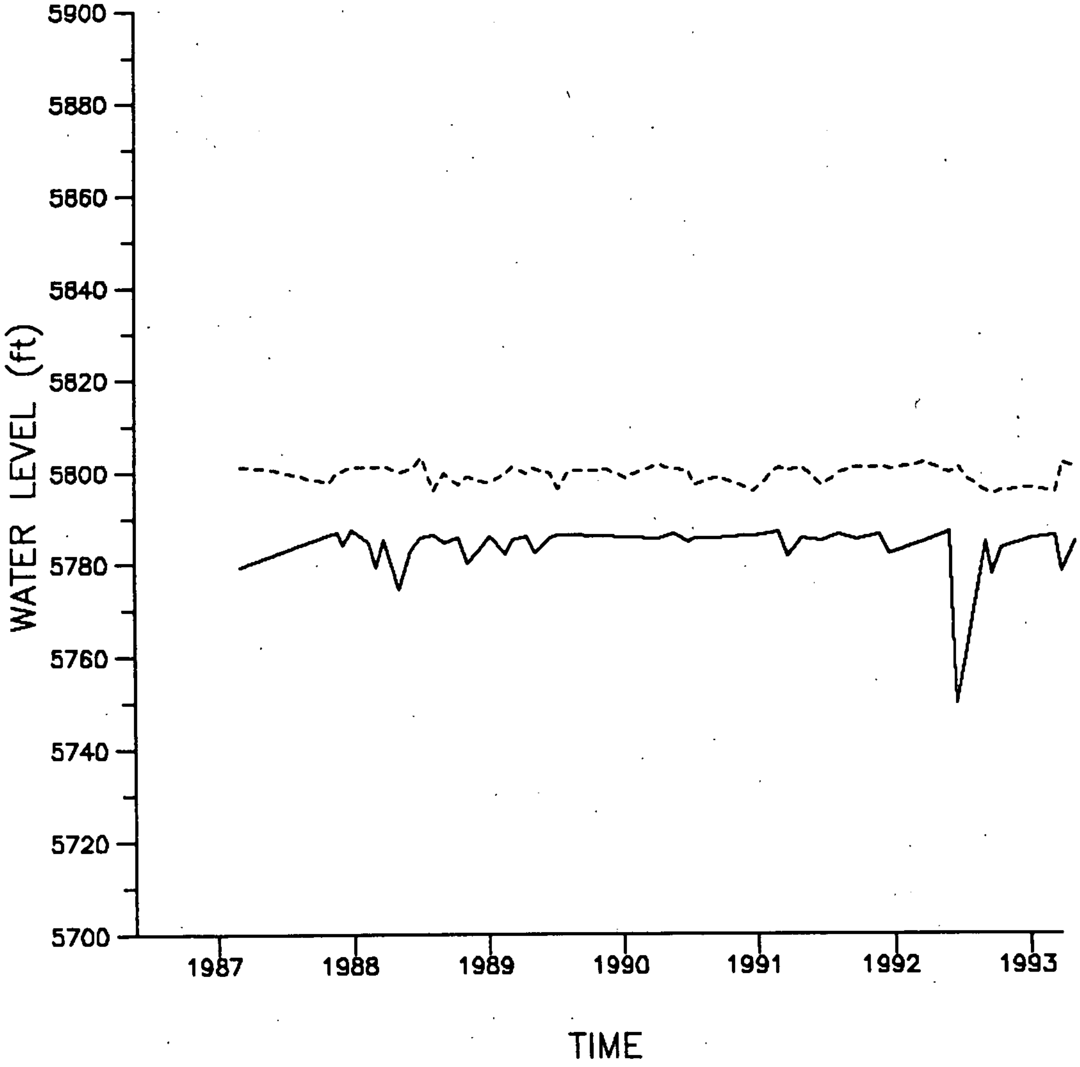


WELL	LITHOLOGY	FILTER PACK (BGS)
4087	ALLUVIUM	(3-7 ft)
B207089	BEDROCK	(30-54 ft)
B207189	BEDROCK	(70-78 ft)
4187	BEDROCK	(81-94 ft)

221

221

HYDROGRAPH 25



WELL	LITHOLOGY	FILTER PACK (BGS)
---- 2987	ALLUVIUM	(3–21 ft)
—— 3087	BEDROCK	(85–94 ft)

222

222

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
1-774-00								751050.000	2084200.000	Inactive	Special Purpose
2-774-00								751150.000	2084050.000	Inactive	Special Purpose
1-776-00								750600.000	2093900.000	Inactive	Special Purpose
2-776-00								750600.000	2083950.000	Inactive	Special Purpose
WS01				LANDFILL	OU7	J	12	752537.895	2082510.780	Abandoned	Special Purpose
WS02				LANDFILL	OU7	L	12	752582.410	2084198.261	Abandoned	Special Purpose
WS03					OU7	K	12	752081.191	2083698.079	Abandoned	Special Purpose
0154					OU4			750900.000	2084400.000	Inactive	Special Purpose
0254								750100.000	2084800.000	Inactive	Special Purpose
0354								750100.000	2084850.000	Inactive	Special Purpose
0160	01-60				OU4	M	11	751513.659	2085432.019	Abandoned	Special Purpose
0260	02-60			SOLAR POND	OU4	M	11	751181.000	2085023.000	Abandoned	Special Purpose
0360	03-60				OU4	M	10	750888.909	2085490.767	Abandoned	Special Purpose
0460	04-60			SOLAR POND	OU4	M	10	750574.000	2085531.000	Abandoned	Special Purpose
0560	05-60				OU4	M	10	750307.869	2085404.108	Abandoned	Special Purpose
0660	06-60				OU4	L	10	750123.618	2084920.637	Abandoned	Special Purpose
0166	01-66					H	8	748963.567	2080547.564	Abandoned	Special Purpose
0266	02-66				OU4	M	11	751061.596	2085681.349	Abandoned	Special Purpose
0366	03-66				OU4	N	10	750813.382	2086264.023	Abandoned	Special Purpose
0168	01-68				OU2	M	9	749241.619	2085580.685	Abandoned	Special Purpose
0268	02-68				OU2	M	8	748887.101	2085578.556	Abandoned	Special Purpose
0368	03-68				OU2	M	8	748887.151	2085957.061	Abandoned	Special Purpose
0468	04-68				OU2	M	9	749241.261	2085956.692	Abandoned	Special Purpose
0171	01-71			903 PAD	OU2	N	8	748803.000	2086327.000	Abandoned	Special Purpose
0271	02-71			903 PAD	OU2	M	8	748513.000	2085950.000	Abandoned	Special Purpose
0371	03-71				OU6	O	12	752022.425	2087035.037	Abandoned	Special Purpose
0471	04-71				OU5	N	7	747861.005	2086137.905	Abandoned	Special Purpose

223

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
1-774-00	Unknown, 1.5" diameter stick-up	
2-774-00	Unknown, 4" diameter well in road north of 774	
1-776-00	Unknown, but apparently to monitor groundwater near Fuel-USTs, 6" diameter PVC	
2-776-00	Unknown, but apparently to monitor groundwater near Fuel-USTs, 6" diameter PVC	
WS01	Apparently to monitor groundwater upgradient of Present Landfill?	
WS02	Apparently to monitor groundwater upgradient of Present Landfill?	
WS03	Apparently to monitor groundwater upgradient of Present Landfill?	
0154	Monitor groundwater downgradient of original Solar Pond, 12" perforated steel pipe	
0254	Apparently to monitor groundwater leakage into 991 tunnels?, 12" perforated steel pipe	
0354	Apparently to monitor groundwater leakage into 991 tunnels?, 12" perforated steel pipe	
0160	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0260	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0360	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0460	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0560	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0660	Monitor groundwater near Solar Evaporation Ponds. Well installation prompted by use of Great Western Reservoir as drinking water source and by known leakage from solar ponds.	
0166	Monitor deep groundwater upgradient of Plant Site	
0266	Monitor deep groundwater near Solar Evaporation Ponds	
0366	Monitor deep groundwater east of Solar Evaporation Ponds	
0168	Monitor groundwater beneath 903 Pad	
0268	Monitor groundwater beneath 903 Pad	
0368	Monitor groundwater beneath 903 Pad	
0468	Monitor groundwater beneath 903 Pad	
0171	Monitor groundwater downgradient of 903 Pad	
0271	Monitor groundwater downgradient of 903 Pad	
0371	Monitor groundwater near Pond A-2	
0471	Monitor groundwater near Woman Creek	

224

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
0571	05-71				OU6	P	11	751261.501	2088453.795	Abandoned	Special Purpose
0671	06-71				OU4	L	11	751515.396	2084746.785	Abandoned	Special Purpose
2-441-71								749000.000	2081900.000	Inactive	Special Purpose
3-707-71								750100.000	2084000.000	Inactive	Special Purpose
2-774-71								751050.000	2084150.000	Inactive	Special Purpose
5-779-71								750500.000	2084500.000	Inactive	Special Purpose
7-779-71								750600.000	2084450.000	Inactive	Special Purpose
1-865-71								749200.000	2084150.000	Inactive	Special Purpose
2-865-71					OU2			749050.000	2084050.000	Inactive	Special Purpose
2-889-71								749100.000	2083750.000	Inactive	Special Purpose
0174	01-74			MOUND AREA		N	9	749626.000	2086195.000	Abandoned	Special Purpose
0374	03-74			EAST TRENCHES	OU2	O	9	749931.000	2087000.000	Abandoned	Special Purpose
0474	04-74				OU2	N	9	749917.884	2086893.123	Abandoned	Special Purpose
0574	05-74				OU2	O	10	750004.600	2087328.528	Abandoned	Special Purpose
0674	06-74				OU2	O	9	749981.172	2087227.530	Abandoned	Special Purpose
0774	07-74			EAST TRENCHES	OU2	P	9	749411.000	2088198.000	Abandoned	Special Purpose
0874	08-74				OU2	P	9	749412.862	2088089.791	Abandoned	Special Purpose
0974	09-74			881 HILLSIDE	OU1	L	8	748028.000	2084783.000	Abandoned	Special Purpose
1074	10-74			881 HILLSIDE	OU1	L	7	747988.000	2084705.000	Abandoned	Special Purpose
1374	13-74				OU5	H	7	747112.985	2080170.569	Abandoned	Special Purpose
1474	14-74			881 HILLSIDE	OU5	H	7	747123.000	2080091.000	Abandoned	CERCLA
1574	15-74				OU5	P	7	747671.800	2088362.772	Abandoned	Special Purpose
1674	16-74			POND C-2	OU5	P	7	747721.000	2088282.000	Abandoned	CERCLA
1774	17-74				OU6	P	11	751170.125	2088514.581	Abandoned	Special Purpose
1874	18-74				CU6	P	11	751130.096	2088502.817	Abandoned	Special Purpose
2174	21-74					J	8	748989.858	2082636.154	Abandoned	Special Purpose
2274	22-74			EAST TRENCHES	OU2	O	9	749525.000	2087126.000	Abandoned	CERCLA
3-SEP-74								751100.000	2084650.000	Inactive	Special Purpose

225

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
0571	Monitor groundwater near South Walnut Creek	
0671	Monitor groundwater downgradient of Solar Evaporation Ponds (SEP)	
2-441-71	Monitor groundwater near process waste tanks, 4" diameter PVC, 18' deep	
3-707-71	Monitor groundwater near process waste tanks, 4" diameter PVC, 20' deep	
2-774-71	Monitor groundwater east of 774 process waste tanks, 4" diameter, 18' deep	
5-779-71	Monitor groundwater near 779 basement tanks (near Fuel-USTs), 4" diameter PVC, 7' deep	
7-779-71	Monitor groundwater near Building 779 basement tanks, 4" diameter PVC, 10' deep	
1-865-71	Monitor groundwater near 865 process waste tanks; in lawn , 4" diameter PVC, no cap, 10' well	
2-865-71	Monitor groundwater near 865 process waste tanks, well plugged about 1' below ground surface, originally 10' deep	
2-889-71	Monitor groundwater near 889 Process Waste Tanks, 4" diameter PVC west of tank area, 15' deep	
0174	Monitor groundwater near mound area	
0374	Monitor groundwater near East Trenches	
0474	Monitor groundwater near East Trenches	
0574	Monitor groundwater near East Trenches	
0674	Monitor groundwater near East Trenches	
0774	Monitor groundwater downgradient of East Trenches	
0874	Monitor groundwater downgradient of East Trenches	
0974	Monitor groundwater near scrap metal storage site now considered IHSS 119.1	
1074	Monitor groundwater near scrap metal storage site now considered IHSS 119.1	
1374	Monitor groundwater near Woman Creek	
1474	Monitor groundwater near Woman Creek	
1574	Monitor groundwater near Woman Creek	
1674	Monitor groundwater near Woman Creek	
1774	Monitor groundwater near South Walnut Creek	
1874	Monitor groundwater near South Walnut Creek	
2174	Monitor groundwater near 664 & Waste Storage Area	
2274	Monitor groundwater near East Trenches	
3-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	

226

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU		RFP Loc	State North	State East	Well Status	Well Classification
								0.000	0.000		
								0.000	0.000		
4-SEP-74								751100.000	2084850.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
5-SEP-74								751100.000	2085200.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
13-SEP-74								750550.000	2086350.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
14-SEP-74								751050.000	2086200.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
15-SEP-74								750850.000	2086100.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
4-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
5-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
13-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
14-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
15-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU		RFP Loc	State North	State East	Well Status	Well Classification
20-SEP-74								751550.000	2085800.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
24-SEP-74								751800.000	2085650.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
25-SEP-74								752050.000	2085800.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
26-SEP-74								751900.000	2085350.000	Inactive	Special Purpose
					OU6			0.000	0.000		
								0.000	0.000		
27-SEP-74								751800.000	2085050.000	Inactive	Special Purpose
								0.000	0.000		
								0.000	0.000		
31-SEP-74								751800.000	2084600.000	Inactive	Special Purpose
								0.000	0.000		

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
20-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
24-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
25-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
26-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
27-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
31-SEP-74	These wells were part of a 31-hole boring program to investigate the presence of nitrate contamination near the Solar Ponds. The holes of varying depths were located in a rough grid pattern over the	
	northeast portion of the Solar Ponds. Limited cross-sectional data is presented in a 1975 Engineering-Science report, but lithologic logs were not included. Groundwater was analyzed for nitrate in this study.	

230

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
								0.000	0.000		
0181	01-81			SOLAR PONDS		R	13	753293.000	2090201.000	Abandoned	CERCLA
0281	02-81			LANDFILL	OU7	Q	13	753678.000	2089849.000	Abandoned	CERCLA
0381	03-81				OU6	P	11	751270.015	2088579.735	Abandoned	Special Purpose
0481	04-81			881 HILLSIDE	OU5	J	7	747570.000	2082078.000	Abandoned	Special Purpose
0581	05-81				OU5	J	7	747572.737	2082159.053	Abandoned	Special Purpose
0681	06-81			SOLAR PONDS		J	10	750859.000	2082503.000	Abandoned	Special Purpose
0781	07-81			SOLAR PONDS		J	10	750860.000	2082539.000	Abandoned	Special Purpose
0881	08-81			WEST SPRAY FIELD	OU11	G	9	749972.000	2079681.000	Abandoned	Special Purpose
0981	09-81			WEST SPRAY FIELD	OU11	G	9	749969.000	2079740.000	Abandoned	Special Purpose
1081	10-81			WEST SPRAY FIELD	OU11	D	8	748871.000	2076105.000	Abandoned	Special Purpose
0182	01-82				OU1	M	8	748039.287	2085116.500	Abandoned	RCRA
0282	02-82				OU1	M	8	748016.949	2085073.056	Abandoned	Special Purpose
0382	03-82			WEST SPRAY FIELD		H	10	750009.227	2080554.109	Abandoned	CERCLA
0482	04-82				OU11	G	9	749972.763	2079048.206	Abandoned	Special Purpose
0582	05-82			WEST SPRAY FIELD	OU11	F	9	749472.000	2078145.000	Abandoned	RCRA
0682	06-82			WEST SPRAY FIELD	OU11	F	9	749420.000	2078147.000	Abandoned	RCRA
0782	07-82			WEST SPRAY FIELD	OU11	D	8	748821.000	2076117.000	Abandoned	RCRA
0186	1-86			BUFFER EAST		U	4	744905.800	2093972.900	Active	Boundary
0286	2-86			BUFFER EAST		U	8	748797.400	2093925.300	Abandoned	Special Purpose
0386	3-86			BUFFER EAST		U	10	750543.400	2093777.900	Active	Boundary
0486	4-86			BUFFER EAST		U	13	753481.700	2093851.200	Abandoned	Boundary
0586	5-86			BUFFER EAST	OU7	Q	13	753703.300	2089775.800	Active	CERCLA
0686	6-86			BUFFER NORTH	OU7	N	13	753568.500	2086654.427	Active	Special Purpose
0786	7-86			LANDFILL	OU7	K	12	752827.000	2083977.200	Active	RCRA
0886	8-86			LANDFILL	OU7	L	12	752816.700	2084001.145	Active	RCRA
0986	9-86			LANDFILL	OU7	J	12	752190.700	2082472.400	Active	RCRA-C
1086	10-86			LANDFILL	OU7	J	12	752168.700	2082490.900	Active	RCRA
1186	11-86			BUFFER EAST	OU6	R	13	753331.400	2090009.700	Abandoned	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
	Wells consist of 3" diameter PVC with no protective casing. Drilled 5' into bedrock; no data on screen length. Well 15-SEP-74 has the casing broken just below ground surface. Well 20-SEP-74 has no cap.	
0181	Monitor groundwater near South Walnut Creek	
0281	Monitor groundwater downgradient of Present Landfill	
0381	Monitor groundwater near South Walnut Creek	
0481	Monitor groundwater near Woman Creek & downgradient of Original Landfill	
0581	Monitor groundwater near Woman Creek & downgradient of Original Landfill	
0681	General plant-site characteristics	
0781	General plant-site characteristics	
0881	Monitor groundwater downgradient of West Spray Field	
0981	Monitor groundwater downgradient of West Spray Field	
1081	Monitor groundwater upgradient of West Spray Field	
0182	Monitor groundwater in 881 Hillside area	
0282	Monitor groundwater in 881 Hillside area	
0382	General plant-site characteristics	
0482	Monitor groundwater downgradient of West Spray Field	
0582	Monitor groundwater in West Spray Field	
0682	Monitor groundwater in West Spray Field	
0782	Monitor groundwater upgradient of West Spray Field	
0186	Monitor groundwater leaving site along likely migration route (drainages)	
0286	Monitor groundwater leaving site along likely migration route (drainages)	
0386	Monitor groundwater leaving site along likely migration route (drainages)	
0486	Monitor groundwater leaving site along likely migration route (drainages)	
0586	Monitor groundwater leaving Present Landfill drainage basin	
0686	Monitor groundwater leaving Present Landfill drainage basin	
0786	Monitor groundwater leaving Present Landfill and entering landfill pond	
0886	Monitor groundwater leaving Present Landfill and entering landfill pond	
0986	Monitor groundwater upgradient of Present Landfill	
1086	Monitor groundwater upgradient of Present Landfill	
1186	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	

232

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
1286	12-86			POND A-3	OU6	O	12	752334.800	2087878.800	Abandoned	CERCLA
1386	13-86			SOLAR POND	OU6	N	11	751856.500	2086051.200	Active	RCRA
1486	14-86			SOLAR POND	OU6	M	11	751855.600	2085837.800	Active	RCRA-C
1586	15-86			SOLAR POND	OU6	M	11	751852.000	2085811.700	Active	RCRA
1686	16-86			SOLAR POND	OU4	M	11	751747.400	2085260.400	Active	RCRA-C
1786	17-86			SOLAR POND	OU4	M	11	751739.800	2085242.200	Active	RCRA
1886	18-86			SOLAR POND	OU6	M	11	751521.800	2085830.800	Active	RCRA
1986	19-86			SOLAR POND	OU6	K	10	750893.900	2083296.100	Active	Special Purpose
2086	20-86			SOLAR POND	OU4	L	11	751112.294	2084357.835	Abandoned	RCRA
2186	21-86			PLANT NORTH	OU4	J	10	750854.900	2082500.600	Active	Special Purpose
2286	22-86			SOLAR POND	OU4	L	10	750718.300	2084410.600	Active	RCRA
2386	23-86			SOLAR POND	OU4	L	10	750338.100	2084258.600	Active	RCRA-C
2486	24-86			SOLAR POND	OU4	L	10	750338.300	2084276.900	Active	RCRA
2586	25-86			SOLAR POND	OU4	L	10	750411.600	2084830.600	Active	RCRA-C
2686	26-86			SOLAR POND	OU4	L	10	750411.000	2084841.400	Active	RCRA
2786	27-86			SOLAR POND	OU4	M	10	750780.500	2085237.500	Active	RCRA-C
2886	28-86			SOLAR POND	OU4	M	10	750802.900	2085239.600	Abandoned	RCRA
2986	29-86			SOLAR POND	OU4	M	10	750598.800	2085687.300	Active	RCRA
3086	30-86			SOLAR POND	OU4	L	11	751078.000	2084921.200	Active	RCRA
3186	31-86			SOLAR POND	OU4	L	11	751050.800	2084763.500	Active	RCRA
3286	32-86			Solar Pond	OU4	L	11	751050.400	2084742.700	Active	RCRA-C
3386	33-86			MOUND AREA	OU6	M	9	749950.300	2085002.800	Active	RCRA
3486	34-86			EAST TRENCHES	OU6	N	10	750161.600	2086193.100	Active	CERCLA
3586	35-86			EAST TRENCHES	OU6	N	10	750167.100	2086219.100	Active	CERCLA

233

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
1286	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	seal adjacent to screen
1386	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	
1486	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	
1586	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	
1686	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	
1786	Monitor groundwater in North Walnut Creek Drainage Basin because of likely route for contaminant migration; also groundwater downgradient of Solar Ponds	
1886	Monitor groundwater downgradient of Solar Evaporation Ponds and upgradient of North Walnut Creek	
1986	Monitor groundwater in North Walnut Creek Drainage Basin	
2086	Monitor groundwater downgradient of Solar Evaporation Pond 207C	
2186	Monitor groundwater downgradient of 371/374 and upgradient of North Walnut Creek	
2286	Monitor groundwater upgradient of Solar Evaporation Pond 207C	
2386	Monitor groundwater upgradient of Solar Evaporation Pond 207C	
2486	Monitor groundwater upgradient of Solar Evaporation Pond 207C	
2586	Monitor groundwater upgradient of Solar Evaporation Ponds 207A/207B	seal adjacent to screen
2686	Monitor groundwater near Solar Evaporation Ponds 207A/207B	
2786	Monitor groundwater downgradient of Solar Evaporation Pond 207B; possible RCRA Point of Compliance Well	
2886	Monitor groundwater downgradient of Solar Evaporation Pond 207B; possible RCRA Point of Compliance Well	
2986	Monitor groundwater east of Solar Evaporation Pond 207B	
3086	Monitor groundwater downgradient of Solar Evaporation Pond 207A	
3186	Monitor groundwater downgradient of Solar Evaporation Pond 207A	
3286	Monitor groundwater downgradient of Solar Evaporation Pond 207A	
3386	Monitor groundwater between Building 991 and South Walnut Creek	
3486	Monitor groundwater in South Walnut Creek Drainage Basin because of likely route for contaminant migration	
3586	Monitor groundwater in South Walnut Creek Drainage Basin because of likely route for contaminant migration	

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
3686	36-86			EAST TRENCHES	OU6	N	10	750387.200	2086819.700	Active	CERCLA
3786	37-86			BUFFER EAST	OU6	P	11	751561.300	2088853.800	Active	CERCLA
3886	38-86			BUFFER EAST	OU6	R	12	752835.000	2090260.500	Active	CERCLA
3986	39-86			BUFFER EAST		R	11	751305.400	2090688.600	Active	Boundary
4086	40-86			EAST TRENCHES	OU2	P	9	749610.500	2088504.600	Active	CERCLA
4186	41-86			EAST TRENCHES	OU2	P	9	749609.100	2088543.300	Inactive	CERCLA
4286	42-86			EAST TRENCHES	OU2	O	9	749559.000	2087114.300	Active	Background
4386	43-86			MOUND AREA	OU2	M	9	749404.100	2085868.900	Active	CERCLA
4486	44-86			PLANT WEST		J	9	749254.083	2082234.278	Active	Special Purpose
4586	45-86			BUFFER WEST	OU11	G	10	750315.800	2079469.800	Abandoned	CERCLA
4686	46-86			BUFFER WEST		F	10	750854.000	2078283.200	Active	Background
4786	47-86			BUFFER WEST		F	10	750824.600	2078288.700	Active	Special Purpose
4886	48-86			WEST SPRAY FIELD	OU11	F	8	748989.200	2078286.700	Active	RCRA-C
4986	49-86			WEST SPRAY FIELD	OU11	F	8	748964.500	2078287.600	Active	RCRA
5086	50-86			WEST SPRAY FIELD	OU11	E	7	747782.800	2077298.800	Active	RCRA
5186	51-86			BUFFER WEST	OU11	D	8	748574.900	2076136.200	Active	RCRA
5286	52-86			BUFFER WEST	OU11	D	8	748606.800	2076132.400	Inactive	RCRA-C
5386	53-86			BUFFER WEST		F	5	745960.300	2078382.000	Active	CERCLA
5486	54-86			BUFFER WEST		F	5	745256.700	2078338.800	Active	Special Purpose
5586	55-86	B405586		BUFFER WEST		F	5	745223.000	2078340.100	Active	Background
5686	56-86			BUFFER SOUTH	OU5	H	7	747041.500	2080220.400	Active	CERCLA
5786	57-86			BUFFER SOUTH	OU5	I	7	747559.300	2081571.800	Active	CERCLA
5886	58-86			881 HILLSIDE	OU5	K	7	747083.700	2083434.900	Active	CERCLA
5986	59-86			881 HILLSIDE	OU1	L	7	747753.500	2084266.700	Abandoned	Special Purpose
5986R	59-86R				OU1	L	7	747752.900	2084260.300	Abandoned	Special Purpose
6086	60-86			881 HILLSIDE		L	7	747788.055	2084271.895	Inactive	Special Purpose

235

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
3686	Monitor groundwater in South Walnut Creek Drainage Basin because of likely route for contaminant migration	
3786	Monitor groundwater in South Walnut Creek Drainage Basin because of likely route for contaminant migration	
3886	Monitor groundwater in South Walnut Creek Drainage Basin because of likely route for contaminant migration	
3986	Proposed RFP-wide RCRA Point of Compliance Well	
4086	Monitor groundwater near East Trenches and East Spray Field along	
4186	Possible migration pathway (replaced by 04991)	
4286	Monitor groundwater downgradient of 903 Pad & upgradient of East Trenches	
4386	Monitor groundwater downgradient of 903 Pad & upgradient of Mound Area, Trench T-1	
4486	Monitor groundwater near UST leak associated with Building 443	
4586	Monitor groundwater downgradient of West Spray Field & upgradient of North Walnut Creek	
4686	General site characteristics sidegradient of West Spray Field	
4786	General site characteristics sidegradient of West Spray Field	no core? no core description
4886	Monitor groundwater in West Spray Field (thought to be downgradient of the West Spray Field when drilled)	no alluvial core description
4986	Monitor groundwater in West Spray Field (thought to be downgradient of the West Spray Field when drilled)	
5086	Monitor groundwater in West Spray Field (thought to be downgradient of the West Spray Field when drilled)	screen = 93.25 ft
5186	Monitor groundwater upgradient of West Spray Field	
5286	Monitor groundwater upgradient of West Spray Field	NO ALLUVIAL CORE
5386	General site characteristics, "background" surface water tributary to Woman Creek	NO CORE
5486	General site characteristics	NO ALLUVIAL CORE
5586	General site characteristics	
5686	Monitor groundwater in Woman Creek Drainage and downgradient of ash pits	
5786	Monitor groundwater in Woman Creek Drainage and downgradient of original landfill	
5886	Monitor groundwater in Woman Creek Drainage Basin	
5986	Monitor groundwater downgradient of IHSS 130 & upgradient of South Intercepter Ditch replaced Well 5986	
5986R	Monitor groundwater downgradient of IHSS 130 & upgradient of South Intercepter Ditch replaced Well 5986	
6086	Monitor groundwater downgradient of IHSS 130 and other 881 Hillside IHSSs	

236

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
6186	61-86			881 HILLSIDE	OU1	K	9	749198.200	2083717.400	Active	Special Purpose
6286	62-86			903 PAD	OU2	M	8	748142.950	2085724.700	Active	CERCLA
6386	63-86			903 PAD	OU2	M	8	748144.500	2085753.100	Active	CERCLA
6486	64-86			BUFFER SOUTH	OU5	M	7	747672.300	2085610.000	Active	CERCLA
6586	65-86			BUFFER SOUTH	OU5	O	7	747881.200	2087500.900	Active	CERCLA
6686	66-86			BUFFER EAST	OU5	S	6	746646.000	2091267.200	Active	CERCLA
6786	67-86			BUFFER EAST		R	8	748722.800	2090378.600	Active	Boundary
6886	68-86			BUFFER SOUTH	OU5	K	7	747154.300	2083581.500	Active	CERCLA
6986	69-86			881 HILLSIDE		L	7	747769.700	2084281.500	Abandoned	Special Purpose
7086	70-86			BUFFER SOUTH	OU5	J	7	747490.900	2082003.300	Active	CERCLA
0187	01-87			881 Hillside	OU1	K	8	748127.300	2083652.900	Active	CERCLA
0287	02-87	BH3-87		881 Hillside	OU1	K	7	747708.000	2083933.600	Abandoned	Special Purpose
0387	0387BR	03-87BR		881 Hillside	OU1	K	7	747705.700	2083961.500	Abandoned	CERCLA
0487	04-87			881 Hillside	OU1	L	7	747943.100	2084886.800	Active	CERCLA
0587	0587BR	05-87BR		881 Hillside	OU1	L	8	748081.100	2084849.200	Active	CERCLA
0687	06-87			881 Hillside	OU1	M	8	748002.600	2085133.700	Abandoned	Special Purpose
0887	0887BR	08-87BR		881 Hillside	OU1	L	7	747757.700	2084294.300	Abandoned	Special Purpose
0987	09-87	BH29-87		903 PAD	OU1	M	9	749068.000	2085347.800	Active	CERCLA
1087	10-87			903 PAD	OU1	M	8	748945.700	2085289.900	Active	CERCLA
1187	11-87BR			903 PAD	OU2	N	8	748409.100	2086100.100	Active	CERCLA
1287	12-87BR			903 PAD	OU2	N	8	748580.600	2086066.400	Active	CERCLA
1487	1487BR	14-87BR		903 PAD	OU2	N	8	748228.100	2086616.000	Active	CERCLA
1587	15-87	BH30-87		903 PAD	OU2	N	9	749010.500	2086248.600	Active	CERCLA
1687	1687BR	6-87BR		903 PAD	OU2	N	9	749129.800	2086248.900	Active	CERCLA
1787	17-87			MOUND AREA	OU2	N	9	749415.200	2086308.000	Abandoned	CERCLA
1887	1887BR	18-87BR		MOUND AREA	OU2	N	9	749404.100	2086338.600	Active	CERCLA
1987	19-87			MOUND AREA	OU2	N	9	749623.300	2086171.400	Active	CERCLA
2087	2087BR	20-87BR		MOUND AREA	OU2	N	9	749634.300	2086154.900	Active	CERCLA
2187	21-87			MOUND AREA	OU6	M	9	749968.900	2085799.400	Active	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
6186	Monitor groundwater in manufacturing area	
6286	Monitor groundwater downgradient of 903 Pad and IHSS 119.2	
6386	Monitor groundwater downgradient of 903 Pad and IHSS 119.2	
6486	Monitor groundwater near Woman Creek Drainage Basin & downgradient of IHSSs in OU1 and OU2	
6586	Monitor groundwater near Woman Creek Drainage Basin & downgradient of IHSSs in OU1 and OU2	
6686	Monitor groundwater in Woman Creek Drainage Basin	
6786	Proposed RFP-wide RCRA Point of Compliance Well downgradient of East Trenches & East Spray Field	
6886	Monitor groundwater near Woman Creek Drainage Basin	
6986	Monitor groundwater downgradient of IHSS 130	
7086	Monitor groundwater near Woman Creek Drainage & downgradient of original landfill	
0187	Characterize groundwater of 881 Hillside & downgradient of IHSS 145	
0287	Characterize groundwater of 881 Hillside & downgradient of IHSS 107	
0387	Characterize groundwater of 881 Hillside & downgradient of IHSS 107	
0487	Characterize groundwater of 881 Hillside & downgradient of IHSS 119.1	
0587	Characterize groundwater of 881 Hillside & downgradient of IHSS 119.1	
0687	Characterize groundwater of 881 Hillside & downgradient of IHSS 119.1	
0887	Characterize groundwater of 881 Hillside & downgradient of IHSS 130	
0987	Characterize groundwater upgradient of 881 Hillside & 903 Pad area	
1087	Characterize groundwater upgradient of 881 Hillside & 903 Pad area	
1187	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1287	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1487	Monitor groundwater downgradient of 903 Pad and area IHSSs & upgradient of Woman Creek	
1587	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1687	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1787	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1887	Monitor groundwater downgradient of 903 Pad and area IHSSs	
1987	Monitor groundwater downgradient of 903 Pad and area IHSSs	
2087	Monitor groundwater downgradient of 903 Pad and area IHSSs	
2187	Monitor groundwater along South Walnut Creek & possibly downgradient of Mound Area & other 903 Pad area IHSSs	

238

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
2287	2287BR	22-87BR		MOUND AREA	OU6	M	9	749923.500	2085821.500	Active	CERCLA
2387	2387BR	23-87BR		MOUND AREA	OU2	M	9	749404.100	2085910.300	Inactive	CERCLA
2487	24-87			EAST TRENCHES	OU2	N	9	749750.800	2086746.300	Active	CERCLA
2587	2587BR	25-87BR		EAST TRENCHES	OU2	N	9	749718.700	2086747.600	Active	CERCLA
2687	26-87			EAST TRENCHES	OU2	O	9	749255.600	2087489.700	Active	CERCLA
2787	27-87			EAST TRENCHES	OU2	P	9	749438.000	2088051.400	Active	CERCLA
2887	2887BR	28-87BR		EAST TRENCHES	OU2	P	9	749438.400	2088090.100	Active	CERCLA
2987	29-87			BUFFER SOUTH	OU5	O	8	748088.900	2087361.500	Active	CERCLA
3087	3087BR	30-87BR		BUFFER SOUTH	OU5	O	8	748089.500	2087424.100	Active	CERCLA
3187	3187BR	31-87BR		EAST TRENCHES	OU2	P	9	749499.700	2088308.800	Active	CERCLA
3287	32-87			EAST TRENCHES	OU2	P	9	749510.600	2088363.000	Inactive	CERCLA
3387	3387	BH56-87		MOUND AREA	OU2	O	9	749854.600	2087920.800	Active	CERCLA
3487	3487BR	34-87BR		EAST TRENCHES	OU2	O	9	749835.800	2087931.400	Active	CERCLA
3587	35-87			EAST TRENCHES	OU2	O	9	749974.400	2087267.700	Active	CERCLA
3687	3687BR	36-87BR		EAST TRENCHES	OU2	O	9	749979.100	2087295.000	Active	CERCLA
3787	37-87			SOLAR POND		M	10	750493.800	2085223.800	Abandoned	RCRA
3887	38-87			SOLAR POND		M	10	750395.600	2085094.300	Active	RCRA
3987	SP08-87	39-87BR				M	11	751080.600	2085268.300	Active	RCRA-C
4087	40-87			LANDFILL	OU7	L	13	753142.600	2084822.600	Active	RCRA
4187	4187BR	41-87BR		LANDFILL	OU7	L	13	753118.200	2084820.700	Active	RCRA-C
4287	42-87			LANDFILL	OU7	M	13	753342.400	2085525.000	Active	CERCLA
4387	43-87	BH57-87		881 HILLSIDE	OU1	L	8	748029.500	2084787.900	Active	CERCLA
4487	44-87	BH58-87		903 PAD	OU1	M	8	748305.500	2085435.000	Active	CERCLA
4587	4587BR	45-87BR	BH59-87	903 PAD	OU1	M	8	748312.800	2085451.300	Active	CERCLA
4787	47-87			881 HILLSIDE	OU1	L	7	747778.600	2084902.600	Active	CERCLA
4887	48-87			881 HILLSIDE	OU1	L	7	747829.400	2084691.400	Active	CERCLA
4987	49-87			881 HILLSIDE	OU1	M	7	747990.700	2085003.500	Active	CERCLA

239

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
2287	Monitor groundwater along South Walnut Creek & possibly downgradient of Mound Area & other 903 Pad area IHSSs	
2387	Monitor groundwater downgradient of 903 Pad and area IHSSs (replaced by 02091)	
2487	Monitor groundwater downgradient of 903 Pad and area IHSSs	
2587	Monitor groundwater downgradient of 903 Pad and area IHSSs	
2687	Monitor groundwater downgradient of East Trenches & upgradient of Woman Creek	
2787	Monitor groundwater immediately downgradient of East Trenches	
2887	Monitor groundwater immediately downgradient of East Trenches	
2987	Monitor groundwater along South Intercepter Ditch & downgradient of 903 Pad and East Trenches	
3087	Monitor groundwater along South Intercepter Ditch & downgradient of 903 Pad and East Trenches	
3187	Monitor groundwater immediately downgradient of East Trenches	
3287	Monitor groundwater immediately downgradient of East Trenches (replaced by 04891)	
3387	Monitor groundwater in East Trenches Area (top of plateau)	
3487	Monitor groundwater in East Trenches Area (top of plateau)	
3587	Monitor groundwater immediately downgradient of East Trenches	
3687	Monitor groundwater immediately downgradient of East Trenches	multiple sands screened
3787	Monitor groundwater immediately downgradient of solar pond 207B, possible RCRA Point of Compliance Well	
3887	Monitor groundwater immediately downgradient of solar pond 207B; possible RCRA Point of Compliance Well	
3987	Monitor groundwater downgradient of Solar Pond 207B & Solar Pond Seepage Trench 1	
4087	Monitor groundwater in Present Landfill Drainage Basin immediately downgradient of landfill pond	
4187	Monitor groundwater in Present Landfill Drainage Basin immediately downgradient of landfill pond	
4287	Monitor groundwater in Present Landfill drainage basin	
4387	Monitor groundwater of 881 Hillside downgradient of IHSS 119.1 near Well 0974	
4487	Monitor groundwater of 881 Hillside and 903 Pad Area immediately downgradient of IHSS 119.2	
4587	Monitor groundwater of 881 Hillside and 903 Pad Area immediately downgradient of IHSS 119.2	
4787	Assessment of groundwater downgradient of 881 Hillside, particularly IHSS 119.1 & Well 0974 upgradient of South Interceptor Ditch	
4887	Assessment of groundwater downgradient of 881 Hillside, particularly IHSS 119.1 & Well 0974 upgradient of South Interceptor Ditch	
4987	Assessment of groundwater downgradient of 881 Hillside, particularly IHSS 119.1 & Well 0974 upgradient of South Interceptor Ditch	

240

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
5087	50-87			881 HILLSIDE	OU1	M	8	748122.500	2085334.100	Active	CERCLA
5187	51-87	BH62-87		881 HILLSIDE	OU1	K	8	748102.800	2083850.300	Active	CERCLA
5287	52-87	BH63-87		881 HILLSIDE	OU1	L	8	748145.100	2084066.700	Active	CERCLA
5387	53-87			881 HILLSIDE	OU1	K	7	747985.000	2083912.000	Active	CERCLA
5487	54-87			881 HILLSIDE	OU1	L	7	747984.500	2084032.100	Active	CERCLA
5587	55-87			881 HILLSIDE	OU5	L	7	747619.200	2084918.800	Active	CERCLA
5687	56-87	SP16-87		SOLAR POND		L	10	750638.300	2084422.800	Active	RCRA
5887	58-87			LANDFILL	OU7	J	12	752234.100	2082530.600	Active	RCRA
5987	59-87			LANDFILL	OU7	J	12	752313.432	2082562.783	Abandoned	RCRA
6087	60-87			LANDFILL	OU7	K	12	752930.200	2083035.000	Active	RCRA
6187	61-87			LANDFILL	OU7	K	12	752860.000	2083071.500	Active	RCRA
6287	62-87			LANDFILL	OU7	K	12	752800.000	2083096.600	Inactive	RCRA
6387	63-87			LANDFILL	OU7	K	12	752717.000	2083137.800	Abandoned	RCRA
6487	64-87			LANDFILL	OU7	K	12	752328.500	2083260.700	Active	RCRA
6587	65-87			LANDFILL	OU7	K	12	752229.600	2083299.000	Active	RCRA
6687	66-87			LANDFILL	OU7	K	12	752149.800	2083325.000	Active	RCRA
6787	67-87			LANDFILL	OU7	K	13	753164.000	2083774.300	Abandoned	RCRA
6887	68-87			LANDFILL	OU7	K	13	753144.500	2083776.400	Active	RCRA
7087	70-87			LANDFILL	OU7	L	12	752570.700	2084196.200	Active	RCRA
7187	71-87			LANDFILL	OU7	L	13	753322.300	2084086.600	Active	RCRA
7287	72-87			LANDFILL	OU7	K	12	752441.000	2083953.000	Active	RCRA
1-EU-88								751850.000	2083300.000	Inactive	Special Purpose
2-EU-88								751550.000	2083050.000	Inactive	Special Purpose
3-EU-88								750150.000	2083600.000	Inactive	Special Purpose

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
5087	Monitor groundwater of 881 Hillside between IHSS 119.1 &119.2	
5187	Monitor groundwater of 881 Hillside adjacent to Building 887	
5287	Monitor groundwater of 881 Hillside upgradient of most IHSSs & downgradient of Building 881	
5387	Monitor groundwater of 881 Hillside upgradient of most IHSSs & downgradient of Building 881	
5487	Monitor groundwater of 881 Hillside upgradient of most IHSSs & downgradient of Building 881	
5587	Monitor groundwater near Woman Creek downgradient of IHSS 119.1, S. Interceptor Ditch	
5687	Monitor groundwater upgradient of solar pond 207C	
5887	Monitor groundwater upgradient of Present Landfill	
5987	Monitor groundwater in Present Landfill inside Groundwater Intercept System	
6087	Drawdown curve to Present Landfill Groundwater Intercept System	
6187	Drawdown curve to Present Landfill Groundwater Intercept System	
6287	Drawdown curve to Present Landfill Groundwater Intercept System (replaced by 6187)	
6387	Drawdown curve to Present Landfill Groundwater Intercept System definition and monitoring groundwater/leachate in Present Landfill	
6487	Drawdown curve to Present Landfill Groundwater Intercept System definition and monitoring groundwater/leachate in Present Landfill	
6587	Drawdown curve to Present Landfill Groundwater Intercept System	
6687	Drawdown curve to Present Landfill Groundwater Intercept System	
6787	Present Landfill Slurry Wall Assessment, upgradient of wall.	
6887	Present Landfill Slurry Wall Assessment, downgradient of wall	
7087	Present Landfill Slurry Wall Assessment, upgradient of wall	
7187	Monitor possible contaminated groundwater flowing to drainage northeast of Present Landfill	
7287	Present Landfill Slurry Wall Assessment, upgradient of wall	
1-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
2-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
3-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	

242

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
4-EU-88								749800.000	2083400.000	Inactive	Special Purpose
5-EU-88								754600.000	2083950.000	Inactive	Special Purpose
6-EU-88								749600.000	2084400.000	Inactive	Special Purpose
7-EU-88								750250.000	2086000.000	Inactive	Special Purpose
8-EU-88								748950.000	2082150.000	Inactive	Special Purpose
9-EU-88								749100.000	2083050.000	Inactive	Special Purpose
B102289	1889			BUFFER NORTH		G	13	753091.454	2079511.816	Active	Background
B102389	1989			BUFFER NORTH	BG	H	13	753833.501	2080256.004	Active	Background
B106089	LF0189			LANDFILL	BG	J	12	752310.000	2082580.000	Active	RCRA
B110889	SF0489			SPRAY FIELD	OU7	G	9	749346.000	2079273.000	Active	RCRA
B110989	SF0589			SPRAY FIELD	OU11	F	9	749795.000	2078778.000	Active	RCRA
B111189	SF0689			SPRAY FIELD	OU11	E	9	749645.000	2077580.000	Active	RCRA
P114389	PZ3589			PLANT	OU11	I	10	750990.393	2081738.755	Active	Special Purpose
P114489	PZ3689			PLANT		I	10	750337.000	2081246.000	Active	Special Purpose
P114589	PZ3789			PLANT		I	10	750396.000	2081731.000	Active	Special Purpose

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
4-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
5-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
6-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
7-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
8-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
9-EU-88	Piezometers installed along routing of proposed electrical utility upgrade project to ensure that the conduit would not be filled with groundwater; piezometers are probably 20 feet deep with a 5-foot slotted screen; piezometers are of 1-inch diameter PVC	
B102289	Characterize Valleyfill Alluvium geochemistry of Rock Creek Drainage Basin	
B102389	Characterize Valleyfill Alluvium geochemistry of Rock Creek Drainage Basin	
B106089	Characterize groundwater & soil geochemistry of Present Landfill Replacement Well for 59-87	
B110889	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
B110989	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
B111189	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
P114389	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P114489	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P114589	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	

244

244

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
P114689	P214689	PZ4289		PLANT		K	9	749943.000	2083044.000	Active	Special Purpose
P114789	PZ4389			PLANT		J	9	749940.000	2082610.000	Active	Special Purpose
P114889	PZ4489			PLANT		J	9	749926.000	2082127.000	Active	Special Purpose
P114989	PZ4589			PLANT		I	9	749959.000	2081661.000	Active	Special Purpose
P115089	PZ4689			PLANT		I	9	749930.000	2081258.000	Active	Special Purpose
P115189	PZ4789					I	9	749641.000	2081236.000	Abandoned	Special Purpose
P115489	PZ4989			PLANT	OU2	J	9	749507.000	2082135.000	Active	Special Purpose
P115589	PZ5089			PLANT		J	9	749551.000	2082658.000	Active	Special Purpose
P115689	PZ5189			PLANT		K	9	749532.000	2083019.000	Active	Special Purpose
P119389	PZ3889			PLANT		I	10	750280.000	2081921.000	Active	Special Purpose

245

~~245~~

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
P114689	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P114789	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P114889	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P114989	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P115089	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P115189	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P115489	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P115589	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P115689	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P119389	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	

246

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
B200589	0589			LANDFILL		K	14	754837.313	2083536.208	Active	Background
B200689	0689			LANDFILL	BG	L	15	755238.381	2084158.435	Active	Background
B200789	0789			LANDFILL	BG	M	15	755765.413	2085008.244	Active	Background
B200889	0889			BUFFER NORTH	BG	M	16	756186.453	2085702.443	Active	Background
B201089	0989			BUFFER NORTH	BG	O	15	755267.041	2087256.993	Active	Background
B201189	1089	BH1189		BUFFER NORTH	BG	N	17	757645.149	2086851.758	Active	Background
B201289	1189	BH1289		BUFFER NORTH	BG	K	17	757595.956	2083581.533	Active	Background
B201489	1289			BUFFER NORTH	BG	M	17	757077.903	2085336.852	Abandoned	Background
B201589	1389	BH1489		BUFFER NORTH	BG	N	17	757328.350	2086648.348	Active	Background
B201889	B301889	1489		BUFFER SOUTH	BG	M	7	747309.508	2085321.978	Abandoned	Background
B202489	2089			BUFFER NORTH	BG	K	17	757394.821	2083893.823	Active	Background
B202589	2189			BUFFER NORTH	BG	M	17	758112.356	2085712.426	Active	Background
B203189	2789BR	2789		BUFFER NORTH	BG	K	14	754848.249	2083556.511	Active	Background
B203289	2889BR	2889		BUFFER NORTH	BG	L	15	755240.485	2084176.603	Active	Background
B203489	2989BR	2989		BUFFER NORTH	BG	M	15	755791.289	2085051.573	Active	Background
B203589	3089BR	3089		BUFFER NORTH	BG	M	16	756208.674	2085743.524	Active	Background
B203689	3189BR	3189		BUFFER NORTH	BG	N	16	756744.954	2086570.444	Abandoned	Background
B203789	3289BR	3289		BUFFER NORTH	BG	M	15	755776.832	2085030.926	Active	Background
B203889	3389BR	3389		BUFFER NORTH	BG	M	16	756198.107	2085720.961	Active	Background
B203989	3489BR	3489		BUFFER NORTH	BG	N	16	756730.055	2086552.286	Active	Background
B204089	3589BR	3589		BUFFER NORTH	BG	O	14	754896.829	2087317.038	Active	Background
B204189	3689BR	3689		BUFFER NORTH	BG	P	15	755340.496	2088469.393	Active	Background

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B200589	Characterize Rocky Flats Alluvium sidegradient of plant in North Buffer Zone	
B200689	Indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound & East Trenches	
B200789	Indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound & East Trenches	
B200889	Indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound & East Trenches	
B201089	Characterize colluvial geochemistry sidegradient of plant in North Buffer Zone	
B201189	Indicative of groundwater quality upgradient of Solar Ponds, Present Landfill, & Walnut Creek catchment basin	
B201289	Indicative of groundwater quality upgradient of Solar Ponds, Present Landfill, & Walnut Creek catchment basin	
B201489	Indicative of groundwater quality upgradient of Solar Ponds, Present Landfill, & Walnut Creek catchment basin	
B201589	Indicative of groundwater quality upgradient of Solar Ponds, Present Landfill, & Walnut Creek catchment basin	
B201889	Characterize colluvial geochemistry in South Buffer Zone and typical of areas impacting Woman Creek Drainage Basin (also formerly known as B301889)	
B202489	Characterize Valleyfill Alluvium geochemistry of Rock Creek Drainage Basin	
B202589	Characterize Valleyfill Alluvium geochemistry of Rock Creek Drainage Basin	
B203189	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203289	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203489	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203589	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203689	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203789	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203889	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B203989	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B204089	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	
B204189	Characterize bedrock groundwater in North Buffer Zone indicative of groundwater quality upgradient of Solar Ponds, 903 Pad, Mound, and East Trenches areas	

248

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
B204689	3889BR			BUFFER NORTH	BG	N	14	754787.989	2086656.884	Abandoned	Background
B205589	4689	BH11-89		BUFFER NORTH	BG	N	17	757654.144	2086855.229	Active	Background
B206189	LF0289BR	LF0289		LANDFILL	BG	K	12	752332.000	2083301.000	Abandoned	RCRA
B206289	LF0389BR	LF0389		LANDFILL	OU7	K	12	752252.793	2083564.162	Active	RCRA
B206389	LF0489BR	LF0489		LANDFILL	OU7	K	12	752548.000	2083926.000	Abandoned	RCRA
B206489	LF0589			LANDFILL	OU7	K	12	752426.981	2083963.858	Active	RCRA
B206589	LF0689BR	LF0689		LANDFILL	OU7	L	12	752457.965	2084121.301	Active	RCRA
B206689	LF0889BR	LF0889		LANDFILL	OU7	L	12	752588.138	2084361.129	Active	RCRA
B206789	LF0989BR	LF0989		LANDFILL	OU7	L	12	752818.000	2084161.000	Active	RCRA
B206889	LF1089BR	LF1089		LANDFILL	OU7	L	12	752823.074	2084781.017	Active	RCRA
B206989	LF1189BR	LF1189		LANDFILL	OU7	L	13	753145.166	2084835.151	Active	RCRA
B207089	LF1289BR	LF1289		LANDFILL	OU7	L	13	753103.080	2084837.160	Active	RCRA
B207189	LF1389BR	LF1389		LANDFILL	OU7	L	13	753091.590	2084837.399	Abandoned	RCRA-C
B207289	LF1489BR	LF1489		LANDFILL	OU7	L	13	753267.413	2084360.129	Active	RCRA
P207389	SEP0189BR	SEP0189		SOLAR POND	OU4	L	10	750195.000	2084468.000	Active	RCRA
P207489	SEP0289			SOLAR POND	OU4	L	10	750197.000	2084481.000	Abandoned	RCRA
P207589	SEP0389			SOLAR POND	OU4	L	10	750395.000	2084843.000	Active	RCRA
P207689	SEP0489			SOLAR POND	OU4	M	10	750398.000	2085318.000	Active	RCRA
P207789	SEP0589			SOLAR POND	OU4	M	10	750392.000	2085343.000	Active	RCRA
P207889	SEP0689			SOLAR POND	OU4	M	10	750670.688	2085343.364	Active	RCRA
P207989	SEP0789BR	SEP0789		SOLAR POND	OU4	M	10	750670.654	2085329.702	Active	RCRA
B208089	SEP0889			SOLAR POND	OU4	M	11	751142.663	2085876.316	Active	RCRA
B208189	SEP0989BR	SEP0989		SOLAR POND	OU4	M	11	751138.046	2085885.118	Active	RCRA
B208289	SEP1089			SOLAR POND	OU4	N	11	751738.556	2086288.523	Active	RCRA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B204689	Characterize bedrock groundwater in North Buffer Zone (same as Well B203189)	
B205589	Characterize colluvial geochemistry in North Buffer Zone (same as Well B201089)	
B206189	Characterize groundwater & soil geochemistry of Present Landfill. Characterization of potential subcropping sandstone units.	
B206289	Characterize groundwater & soil geochemistry of Present Landfill. Characterization of potential subcropping sandstone units.	
B206389	Characterize groundwater & soil geochemistry of Present Landfill. Characterization of south slurry wall effectiveness.	
B206489	Characterize groundwater & soil geochemistry of Present Landfill. Possibly characterization of IHSS 166.1.	
B206589	Characterize groundwater & soil geochemistry of Present Landfill. Characterization of potential subcropping sandstone units.	
B206689	Characterize groundwater & soil geochemistry of Present Landfill. Possibly characterization of water quality downgradient of IHSS 166.3.	
B206789	Characterize groundwater & soil geochemistry c Present Landfill. Characterization of potential subcropping sandstone units.	
B206889	Characterize groundwater & soil geochemistry of Present Landfill. Evaluation of groundwater quality leaving Present Landfill area and verification of subsurface geoogy in 4187BR.	
B206989	Characterize groundwater & soil geochemistry of Present Landfill. Evaluation of groundwater quality leaving Present Landfill area and verification of subsurface geoogy in 4187BR.	
B207089	Characterize groundwater & soil geochemistry of Present Landfill. Evaluation of groundwater quality leaving Present Landfill area and verification of subsurface geoogy in 4187BR.	
B207189	Characterize groundwater & soil geochemistry of Present Landfill. Evaluation of groundwater quality leaving Present Landfill area and verification of subsurface geoogy in 4187BR.	
B207289	Characterize groundwater & soil geochemistry of Present Landfill. Evaluation of groundwater quality leaving Present Landfill area and verification of subsurface geoogy in 4187BR.	
P207389	Monitor groundwater geochemistry upgradient of Solar Ponds	
P207489	Monitor groundwater geochemistry upgradient of Solar Ponds	
P207589	Monitor groundwater quality downgradient of Solar Ponds	
P207689	Monitor groundwater quality downgradient of Solar Ponds	
P207789	Monitor groundwater quality downgradient of Solar Ponds	
P207889	Monitor groundwater quality downgradient of Solar Ponds	
P207989	Monitor groundwater quality downgradient of Solar Ponds	
B208089	Monitor groundwater quality downgradient of Solar Ponds	
B208189	Monitor groundwater quality downgradient of Solar Ponds	
B208289	Monitor groundwater quality downgradient of Solar Ponds	

258

250

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
B208389	SEP1189			SOLAR POND	OU4	M	11	751687.153	2085584.291	Active	RCRA
B208489	SEP1289BR			SOLAR POND	OU4	M	11	751682.780	2085635.821	Active	RCRA
B208589	SEP1389			SOLAR POND	OU4	M	11	751803.763	2085476.844	Inactive	RCRA
B208689	SEP1489BR	SEP1489		SOLAR POND	OU4	M	11	751727.919	2085249.887	Active	RCRA
B208789	SEP1589			SOLAR POND	OU4	L	11	751754.949	2084450.388	Inactive	RCRA
P208889	SEP1689BR	SEP1689		SOLAR POND	OU4	M	11	751086.013	2085248.593	Active	RCRA-C
P208989	SEP1789BR	SEP1789		SOLAR POND	OU4	L	11	751044.000	2084839.000	Active	RCRA
P209089	SEP1889BR	SEP1889		SOLAR POND	OU4	L	10	750566.000	2084910.000	Active	RCRA
P209189	SEP1989BR	SEP1989		SOLAR POND	OU4	L	10	750762.000	2084309.000	Inactive	RCRA
P209289	SEP2089			SOLAR POND	OU4	L	10	750863.000	2084139.000	Active	RCRA
P209389	SEP2189BR	SEP2189		SOLAR POND	OU4	L	10	750864.000	2084130.000	Inactive	RCRA
P209489	SEP2289BR	SEP2289		SOLAR POND	OU4	L	10	750991.000	2084634.000	Active	RCRA
P209589	SEP2389BR	SEP2389		SOLAR POND	OU4	M	11	751071.000	2085286.000	Active	RCRA
P209689	SEP2489BR	SEP2489		SOLAR POND	OU4	M	10	750533.000	2085514.000	Active	RCRA
P209789	SEP2589			SOLAR POND	OU4	M	10	750579.000	2085481.000	Active	RCRA
P209889	SEP2689BR	SEP2689		SOLAR POND	OU4	L	11	751194.000	2084984.000	Active	RCRA
P209989	SEP2889			SOLAR POND	OU4	L	11	751564.907	2084648.553	Abandoned	RCRA
P210089	SEP2989BR	SEP2989		SOLAR POND	OU4	L	11	751563.539	2084639.322	Active	RCRA
P210189	SEP3089BR	SEP3089		SOLAR POND	OU4	L	10	750752.200	2084410.800	Active	RCRA
P210289	SEP3189BR	SEP3189		SOLAR POND	OU4	M	10	750564.000	2085223.000	Abandoned	RCRA
B210389	SEP3289BR	SEP3289		SOLAR POND	OU4	M	11	751695.783	2085116.360	Inactive	RCRA
B210489	SEP3389			SOLAR POND	OU4	M	11	751801.926	2085513.218	Active	RCRA
P213689	PZ1089			PLANT	OU11	K	9	749460.000	2083736.000	Active	Special Purpose
B213789	PZ1389			B-1 POND		N	10	750538.000	2086677.000	Active	Special Purpose

251

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B208389	Monitor groundwater quality downgradient of Solar Ponds	
B208489	Monitor groundwater quality downgradient of Solar Ponds	
B208589	Monitor groundwater quality downgradient of Solar Ponds (replaced by B210489)	
B208689	Monitor groundwater quality downgradient of Solar Ponds	
B208789	Monitor groundwater geochemistry upgradient of Solar Ponds (replaced by B209989)	
P208889	Monitor groundwater quality downgradient of Solar Ponds	
P208989	Monitor groundwater quality downgradient of Solar Ponds	
P209089	Monitor groundwater geochemistry upgradient of Solar Ponds	
P209189	Monitor groundwater quality downgradient of Solar Ponds (replaced by P210189)	
P209289	Monitor groundwater geochemistry upgradient of Solar Ponds	
P209389	Monitor groundwater geochemistry upgradient of Solar Ponds (replaced by B208689)	
P209489	Monitor groundwater quality downgradient of Solar Ponds	
P209589	Monitor groundwater quality of subcropping sandstone downgradient of Solar Ponds	
P209689	Monitor groundwater quality downgradient of Solar Ponds and evaluate potentiometric conditions	
P209789	Monitor groundwater quality downgradient of Solar Ponds and evaluate potentiometric conditions	
P209889	Monitor groundwater quality downgradient of Solar Ponds	
P209989	Monitor groundwater quality downgradient of Solar Ponds	
P210089	Monitor groundwater quality downgradient of Solar Ponds	
P210189	Monitor groundwater quality of subcropping sandstone upgradient of Solar Ponds	
P210289	Monitor groundwater quality of shallow sandstone downgradient of Solar Ponds	
B210389	Monitor groundwater quality downgradient of Solar Ponds (replaced by B208689)	
B210489	Monitor groundwater quality downgradient of Solar Ponds	
P213689	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
B213789	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
P213889	PZ1489			PLANT		N	10	750466.000	2086109.000	Active	RCRA
P213989	PZ1489A			PLANT		N	10	750468.000	2086102.000	Active	RCRA
P215789	PZ5289			PLANT		K	9	749470.000	2083430.000	Active	Special Purpose
B217289	5489BR			BUFFER EAST		U	10	750563.300	2093776.300	Active	Boundary
B217489	5689BR			NE TRENCHES	OU2	N	9	749454.000	2086818.000	Inactive	CERCLA
B217589	5789BR			EAST TRENCHES	OU2	O	9	749817.000	2087189.000	Inactive	CERCLA
B217689	5889BR			EAST TRENCHES	OU2	N	9	749628.500	2086745.100	Inactive	CERCLA
B217789	6089BR			EAST TRENCHES	OU2	O	9	749494.000	2087341.000	Inactive	CERCLA
P218089	OP0389			ORIGINAL PROCES	OU2	L	9	749941.000	2084020.000	Active	Special Purpose
P218289	P118289	OP0189		PLANT	OU9	J	8	748952.000	2082653.000	Active	Special Purpose
P218389	PZ2789			PLANT		M	10	750831.000	2085648.000	Active	RCRA
B218789	P218789	6489		EAST TRENCHES	OU1	N	9	749425.000	2086720.000	Active	CERCLA
P219089	BH7740689			PLANT		L	11	751127.000	2084117.000	Inactive	Special Purpose
P219189	PZ1889			PLANT		L	11	751222.000	2084010.000	Active	Special Purpose
P219489	PZ1589			PLANT		M	10	750415.000	2085651.000	Active	RCRA
P219589	PZ1289			PLANT		M	10	750268.000	2085536.000	Active	RCRA
P219989	6989			PLANT		N	9	749415.000	2086299.000	Inactive	CERCLA
B220189	7189			EAST TRENCHES		O	9	749937.900	2087001.000	Inactive	CERCLA
B220489	7489			EAST TRENCHES		O	9	749555.000	2087096.000	Abandoned	CERCLA
B301889											

253

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
P213889	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P213989	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P215789	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
B217289	Research & Development** installed near Indiana Street boundary line to investigate groundwater geochemistry in a deep sandstone interval	
B217489	Monitor groundwater and test seismic information obtained previously, East Trenches	
B217589	Monitor groundwater and test seismic information obtained previously, East Trenches	
B217689	Monitor groundwater and test seismic information obtained previously, East Trenches	
B217789	Monitor groundwater and test seismic information obtained previously, East Trenches	
P218089	Characterize groundwater & soil geochemistry, Original Process Waste Line	
P218289	Characterize groundwater & soil geochemistry, Original Process Waste Line	
P218389	Plant-wide Piezometer Observation Well for yearly water level measurements	
B218789	Monitor groundwater and test seismic information obtained previously, East Trenches	
P219089	Characterize groundwater & soil geochemistry near Building 774	
P219189	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells	
P219489	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells	
P219589	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells	
P219989	Research & Development**, East Trenches, adjacent to Well 1787	
B220189	Research & Development**, East Trenches, adjacent to Well 0471	
B220489	Research & Development**, East Trenches, adjacent to Well 4286	
B301889	see B201889	

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc	State North	State East	Well Status	Well Classification
B302089	1689			BUFFER SOUTH		K 6	746786.296	2083490.454	Active	Background
B302789	2389			BUFFER SOUTH	BG	N 4	744706.974	2086227.082	Active	Background
B302889	2489			BUFFER EAST	BG	Q 5	745826.744	2089524.809	Active	Background
B302989	2589			BUFFER EAST	BG	S 5	745355.609	2091265.900	Active	Background
B303089	2689			BUFFER EAST	BG	U 2	742278.369	2093993.591	Active	Background
B304289	3789BR	3789		BUFFER SOUTH	BG	N 4	744679.300	2086215.370	Abandoned	Background
B304589	3789P			BUFFER SOUTH	BG	N 4	744690.507	2086221.593	Inactive	Special Purpose
B304789	3989BR	3989		BUFFER SOUTH	BG	M 7	747308.822	2085298.766	Active	Background
B304889	4089BR	4089		BUFFER SOUTH	BG	Q 5	745817.244	2089570.424	Active	Background
B304989	4189BR	4189		BUFFER EAST	BG	Q 5	745801.293	2089599.874	Active	Background
P313489	PZ0589			PLANT	BG	K 8	748913.000	2083062.000	Active	Special Purpose
P313589	PZ0789			PLANT		K 8	748510.000	2083547.000	Active	Special Purpose
P314089	P214089	PZ2389		PLANT		K 9	749461.000	2083653.000	Active	Special Purpose
P314289	PZ3189			PLANT		K 8	748216.000	2083280.000	Active	Special Purpose
B315289	5989BR			EAST TRENCHES		N 9	749225.000	2086766.000	Inactive	Special Purpose

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B302089	Characterize colluvial geochemistry in South Buffer Zone and typical of areas impacting Woman Creek Drainage Basin	
B302789	Characterize Valleyfill Alluvium geochemistry of Woman Creek Drainage Basin & other drainages in South Buffer Zone	
B302889	Characterize Valleyfill Alluvium geochemistry of Woman Creek Drainage Basin & other drainages in South Buffer Zone	
B302989	Characterize Valleyfill Alluvium geochemistry of Woman Creek Drainage Basin & other drainages in South Buffer Zone	
B303089	Characterize Valleyfill Alluvium geochemistry of Woman Creek Drainage Basin & other drainages in South Buffer Zone	
B304289	Characterize bedrock groundwater in South Buffer Zone (same as Well B304789)	
B304589	Background characterization of bedrock groundwater	
B304789	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
B304889	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
B304989	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
P313489	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P313589	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P314089	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P314289	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
B315289	Monitor groundwater and test seismic information obtained previously, East Trenches.	

256

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
B317189	5389BR			BUFFER EAST		U	8	748807.000	2093921.000	Active	Boundary
P317989	OP0289			ORIGINAL PROCESS		L	8	748891.000	2084272.000	Active	Special Purpose
B319889	6889			BUFFER EAST	OU9	Q	5	745835.000	2089522.000	Inactive	Special Purpose
P320089	P220089	7089		PLANT		K	8	748799.000	2083280.000	Active	Special Purpose
B320589	7589			881 HILLSIDE		L	9	749947.600	2084896.900	Abandoned	Special Purpose
B400089	0189P			BUFFER WEST		F	4	744565.000	2078309.000	Inactive	Special Purpose
B400189	0189A	BH01		BUFFER WEST	BG	F	4	744565.183	2078308.578	Active	Background
B400289	0289			BUFFER WEST	BG	G	4	744644.648	2079142.187	Active	Background
B400389	0389			BUFFER WEST	BG	F	3	743760.358	2078394.856	Active	Background
B400489	0489	BH0489		BUFFER WEST	BG	G	3	743820.597	2079205.266	Active	Background
B401989	1589			BUFFER SOUTH	BG	I	5	745848.807	2081634.711	Active	Background
B402189	1789BR	1789		BUFFER SOUTH	BG	I	6	746339.128	2081476.448	Active	Background
B402689	2289			BUFFER WEST	BG	F	7	747228.605	2078262.303	Active	Background
B405189	4289BR	4289		BUFFER SOUTH	BG	J	6	746782.390	2082448.061	Active	Background
B405289	4389BR	4389		BUFFER SOUTH	BG	J	6	746797.863	2082464.793	Active	Background
B405389	4489BR	4489		BUFFER SOUTH	BG	N	4	744717.960	2086232.040	Active	Background
B405489	4589BR	4589		BUFFER WEST	BG	F	5	745190.800	2078357.000	Active	Background
B405689	4789			BUFFER WEST	BG	G	3	743819.456	2079189.912	Active	Background
B405789	4889			BUFFER WEST	BG	G	3	743821.000	2079220.000	Active	Background
B405889	4989BR	4989		BUFFER SOUTH	BG	I	6	746332.131	2081476.307	Active	Background
B405989	5089			BUFFER SOUTH	BG	I	6	746349.092	2081476.647	Active	Background
B410589	SF0189			SPRAY FIELD	OU7	E	7	747771.000	2077811.000	Active	RCRA
B410689	SF0289			SPRAY FIELD	OU11	F	8	748350.000	2078729.000	Active	RCRA
B410789	SF0389			SPRAY FIELD	OU11	G	8	748791.000	2079141.000	Active	RCRA
B411289	SF0789			WEST SPRAY FIELD	OU11	D	8	748717.803	2076943.021	Active	RCRA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B317189	Research & Development** installed near Indiana Street boundary line to investigate groundwater geochemistry in a deep sandstone interval	
P317989	Characterize groundwater & soil geochemistry, Original Process Waste Line	
B319889	Research & Development**, South Buffer Zone, twin to Well B302889	
P320089	Investigate Volatile Organic Compounds (VOC) adjacent to construction trailer	
B320589	Research & Development**, 881 Hillside, adjacent to Well 0487	
B400089	Shallow alluvial well replaced by Well B400189	
B400189	Characterize Rocky Flats Alluvium in Southwest Buffer Zone indicative of groundwater	
B400289	Quality upgradient of West Spray Field & Woman Creek Drainage Basin	Missing core, no apparent top of bedrock
B400389	Quality upgradient of West Spray Field & Woman Creek Drainage Basin	
B400489	Quality upgradient of West Spray Field & Woman Creek Drainage Basin	
B401989	Characterize colluvial geochemistry in South Buffer Zone and typical of areas impacting Woman Creek Drainage Basin	
B402189	Characterize bedrock groundwater quality of South Buffer Zone	
B402689	Characterize Valleyfill Alluvium geochemistry of Woman Creek Drainage Basin & other drainages in South Buffer Zone	
B405189	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
B405289	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
B405389	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	
B405489	Characterize bedrock groundwater in South Buffer Zone indicative of groundwater quality upgradient of West Spray Field and Woman Creek Drainage Basin	COMPLETE LOG NOT FOUND, BR CAN'T BE DETERMINED
B405689	Evaluate geochemical stratification within groundwater west of Plant Site to aid interpretation of impacts from West Spray Field	
B405789	Evaluate geochemical stratification within groundwater west of Plant Site to aid interpretation of impacts from West Spray Field	
B405889	Characterize bedrock groundwater in South Buffer Zone (same as Well B304789)	
B405989	Characterize colluvial geochemistry in South Buffer Zone (same as Well B201889)	
B410589	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
B410689	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
B410789	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
B411289	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	

258

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
B411389	SF0889			WEST SPRAY FIELD	OU11	E	8	748727.952	2077712.587	Active	RCRA
P414189	PZ2489			PLANT		J	9	749059.000	2082986.000	Active	Special Purpose
P415889	PZ5389			PLANT		H	9	749125.000	2080718.000	Active	Special Purpose
P415989	PZ5489			PLANT		I	9	749025.000	2081011.000	Active	Special Purpose
P416089	PZ5589			PLANT		H	8	748605.000	2080720.000	Active	Special Purpose
P416189	PZ5689			PLANT		I	8	748606.000	2081120.000	Active	Special Purpose
P416289	PZ5789			PLANT		I	8	748598.000	2081555.000	Active	Special Purpose
P416389	PZ5889			PLANT		H	8	748313.000	2080631.000	Active	Special Purpose
P416489	PZ5989			PLANT		I	8	748210.000	2081113.000	Active	Special Purpose
P416589	PZ6089			PLANT		I	8	748211.000	2081546.000	Active	Special Purpose

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
B411389	Monitor groundwater geochemistry of Rocky Flats Alluvium in West Spray Field	
P414189	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P415889	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P415989	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416089	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416189	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416289	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416389	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416489	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416589	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	

260

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
P416689	PZ6189			PLANT		I	8	748147.000	2081941.000	Active	Special Purpose
P416789	PZ6289			PLANT		J	8	748206.000	2082382.000	Active	Special Purpose
P416889	PZ6389			PLANT		J	8	748206.000	2082815.000	Active	Special Purpose
P416989	5189BR			BUFFER WEST		I	8	748780.000	2081034.000	Inactive	Special Purpose
P419689	PZ0489			PLANT		J	8	748522.000	2082513.000	Active	Special Purpose
0190	TH 10W					H	11	751087.000	2080307.000	Active	Special Purpose
0290	TH 2W					G	12	752245.000	2079308.000	Active	Special Purpose
0390	TH 1W					F	11	751328.000	2078292.000	Active	Special Purpose
0490	TH 5W					G	11	751862.000	2079635.000	Abandoned	Special Purpose
0590	TH 21W					G	5	745484.000	2079248.000	Active	Special Purpose
0690	TH 27W					H	5	745239.000	2080143.000	Active	Special Purpose
0790	TH 24W					G	4	744708.000	2079640.000	Active	Special Purpose
0990	TH 30W					H	4	744377.000	2080517.000	Active	Special Purpose
1090	TH 19W					J	14	754160.000	2082725.000	Inactive	Special Purpose
1190	TH 17W					J	13	753226.000	2082084.000	Inactive	Special Purpose
1290	TH 13W					I	12	752605.000	2081400.000	Inactive	Special Purpose
1390	TH 11W					H	12	752848.000	2080951.000	Inactive	Special Purpose
1490	TH 8AW					G	10	750839.000	2079028.000	Inactive	Special Purpose
3390	B303390				OU1	M	8	748111.200	2085517.500	Inactive	CERCLA
3490					OU1	M	8	748156.500	2085594.200	Inactive	CERCLA
3590					OU1	M	8	748201.400	2085690.800	Inactive	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
P416689	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416789	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416889	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
P416989	Research & Development** installed near Indiana Street boundary line to investigate groundwater geochemistry in a deep sandstone interval	
P419689	Industrial area Piezometer Observation Wells for yearly water level measurements in partial accordance with Agreement In Principle requirements for the installation of 50 plant-wide monitoring wells labeled on map as P213789	
0190	New Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0290	New Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0390	New Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0490	New Landfill groundwater characterization	Piezometer. Bedrock elevation estimated from diagrams.
0590	Site 3 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0690	Site 3 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0790	Site 3 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
0990	Site 3 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
1090	Site 2 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
1190	Site 2 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
1290	Site 2 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
1390	Site 2 Proposed Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
1490	New Landfill groundwater characterization	Bedrock elevation estimated from diagrams.
3390	Piezometers for water level measurements along proposed 881 Hillside French Drain extension	
3490	Piezometers for water level measurements along proposed 881 Hillside French Drain extension	
3590	Piezometers for water level measurements along proposed 881 Hillside French Drain extension	

262

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc	State North	State East	Well Status	Well Classification
3690					OU1	M 8	748249.000	2085779.600	Inactive	CERCLA
00191					OU2	N 9	749237.492	2086244.043	Active	CERCLA
00291					OU2	N 9	749196.593	2086622.998	Active	CERCLA
00391					OU2	N 8	748886.269	2086805.241	Active	CERCLA
00491					OU2	N 8	748645.386	2086806.873	Active	CERCLA
00691					OU2	N 8	748321.624	2086378.984	Active	CERCLA
00791					OU2	N 8	748302.590	2086023.298	Active	CERCLA
00891					OU2	O 8	748551.327	2087260.012	Active	CERCLA
00991					OU2	N 8	748081.975	2086190.340	Active	CERCLA
01291				903 PAD	OU2	O 8	748335.327	2087062.484	Active	CERCLA
01391					OU2	M 9	749401.970	2085225.747	Active	CERCLA
01491					OU2	M 9	749430.090	2085474.270	Active	CERCLA
01791					OU2	N 9	749504.005	2086018.033	Active	CERCLA
01891					OU2	N 9	749437.806	2086023.248	Active	CERCLA
01991				NE TRENCHES	OU2	N 9	749475.670	2086733.526	Active	CERCLA
02091					OU2	N 9	749617.289	2086427.873	Active	CERCLA
02191					OU2	N 9	749707.716	2086166.421	Active	CERCLA
02291					OU2	N 9	749879.893	2086138.965	Active	CERCLA
02391					OU2	N 9	749852.872	2086599.701	Active	CERCLA
02491					OU2	N 9	749948.521	2086432.040	Active	CERCLA
02591				NE TRENCHES	OU2	Q 10	750936.917	2089162.702	Active	CERCLA
02691					OU2	N 10	750384.908	2086042.689	Active	CERCLA
02791					OU2	O 9	749854.093	2087029.140	Active	CERCLA
02891					OU2	O 9	749888.239	2087097.905	Active	CERCLA
02991					OU2	N 9	749777.434	2086970.302	Active	CERCLA
03091					OU2	O 9	749832.627	2087159.679	Active	CERCLA
03191					OU2	O 9	749881.742	2087440.945	Active	CERCLA
03391					OU2	N 10	750047.252	2086993.723	Active	CERCLA
03591					OU2	O 9	749998.993	2087691.261	Active	CERCLA
03691				NE TRENCHES	OU2	O 10	750199.365	2087072.091	Active	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
3690	Piezometers for water level measurements along proposed 881 Hillside French Drain extension	
00191	Volatile Organic Plume (VOP) definition downgradient of 903 Pad & Mound Areas	static water level at 24 feet
00291	Volatile Organic Plume (VOP) definition downgradient of 903 Pad & Mound Areas	static water at 27.8 feet
00391	Volatile Organic Plume (VOP) definition downgradient of 903 Pad & Mound Areas	static water at 20.7 feet
00491	Volatile Organic Plume Definition downgradient of 903 Pad	
00691	Volatile Organic Plume Definition downgradient of 903 Pad	
00791	Volatile Organic Plume Definition downgradient of 903 Pad	static water level at 15. feet
00891	Volatile Organic Plume Definition downgradient of 903 Pad	
00991	Volatile Organic Plume Definition downgradient of 903 Pad	
01291	Volatile Organic Plume Definition downgradient of 903 Pad	
01391	Monitor groundwater quality upgradient of OU2	
01491	Monitor groundwater quality adjacent to possible Pallet Burn Site	static water level at 12.8 feet
01791	Monitor groundwater quality downgradient of Mound Site	static water levels are 12.3 ft. (1/6/92) and 15.5 ft. (11/25/91)
01891	Monitor groundwater quality upgradient of Trench T-1, downgradient of 903 Pad	static water level at 17.9 ft.
01991	VOP definition downgradient of 903 Pad & Mound Areas	static water level at 18.0
02091	VOP definition downgradient of Mound Area	static water level is at 18 ft.
02191	VOP definition downgradient of Mound Area	
02291	VOP definition downgradient of Mound Area	static water level is at 11.1
02391	VOP definition downgradient of Mound Area	
02491	VOP definition downgradient of Mound Area	
02591	VOP definition downgradient of Mound Area	
02691	VOP definition downgradient of Mound Area	static water levels at 12 (11/12/91) and at 5.9 (1/7/92)
02791	VOP definition downgradient of Trench T3, replaced Well 0374	
02891	VOP definition downgradient of Trench T-3	
02991	VOP definition downgradient of Trench T-3	static water levels at 25.4 ft. (1/7/92 and 27 ft. (11/25/91)
03091	VOP definition downgradient of Trench T-4, upgradient of T-11	static water levels at 33.7 (1/7/92) and 41.3 (11/15/91)
03191	VOP definition downgradient of Trench T-4, upgradient of T-10	static water level at 11/8/91 is 17 ft
03391	VOP definition and extent of saturation downgradient of East Trenches area	static water level at 23.1 ft on 1/7/92
03591	VOP definition and extent of saturation downgradient of East Trenches area	static water level is at 28.2 on 1/7/92
03691	VOP definition and extent of saturation downgradient of East Trenches area	static water is at 28.6 on 3/24/92

264

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc	State North	State East	Well Status	Well Classification
03791					OU2	O 10	750206.133	2087182.780	Active	CERCLA
03891					OU2	O 10	750181.524	2087615.295	Active	CERCLA
03991					OU2	P 10	750400.906	2088449.233	Active	CERCLA
04091				NE BUFFER ZONE	OU2	P 10	750729.751	2088689.896	Active	CERCLA
04191					OU2	O 9	749430.443	2087330.445	Active	CERCLA
04291				SE TRENCHES	OU2	O 9	749474.723	2087654.185	Active	CERCLA
04491					OU2	O 9	749362.548	2087887.934	Active	CERCLA
04591					OU2	P 9	749286.387	2088034.249	Active	CERCLA
04691					OU2	P 9	749342.448	2088316.084	Active	CERCLA
04891					OU2	P 9	749439.153	2088680.329	Active	CERCLA
04991					OU2	P 9	749551.130	2088844.091	Active	CERCLA
05091					OU2	P 9	749894.384	2088824.855	Active	CERCLA
05191					OU2	P 9	749957.396	2088671.683	Active	CERCLA
05291					OU2	P 9	749958.287	2088377.093	Active	CERCLA
05391					OU2	P 10	750152.860	2088297.625	Active	CERCLA
05691					OU2	O 10	750053.140	2087620.690	Active	CERCLA
05991					OU2	N 8	748496.238	2086338.428	Active	CERCLA
06091					OU2	P 10	750405.067	2088962.909	Active	CERCLA
06191					OU2	Q 10	750864.986	2089984.782	Active	CERCLA
06291					OU2	S 11	751639.013	2091094.174	Active	CERCLA
06391					OU2	S 11	751197.051	2091071.425	Active	CERCLA
06491					OU2	U 11	751192.859	2093867.279	Active	CERCLA
06591				903 PAD AND LIP	OU2	M 9	749063.870	2085534.806	Active	CERCLA
06691				903 PAD	OU2	M 9	749067.870	2085714.440	Active	CERCLA
06791					OU2	M 8	748854.615	2085645.631	Active	CERCLA
06891				903 PAD	OU2	M 9	749258.383	2085882.888	Active	CERCLA
06991				903 PAD	OU2	M 9	749167.760	2085989.566	Active	CERCLA
07191				903 LIP	OU2	M 8	748849.741	2085908.389	Active	CERCLA
07291				903 Pad.	OU2	M 8	748748.172	2085765.568	Active	CERCLA
07391				903 PAD	OU2	M 8	748547.462	2085827.204	Active	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
03791	VOP definition and extent of saturation downgradient of East Trenches area	static water levels are 27.5 (10/10/91) and 36.4 (1/7/92)
03891	VOP definition and extent of saturation downgradient of East Trenches area	static water level is at 6.4 ft on 11/12/91
03991	VOP definition and extent of saturation downgradient of East Trenches area	static water level is at 34.8 ft on 3/20/92
04091	VOP definition and extent of saturation downgradient of East Trenches area	no water level recorded
04191	Monitor groundwater quality upgradient of East Trenches	no water level recorded
04291/HEMA	Monitor groundwater quality downgradient of Trench T-4	no water level recorded
04491	VOP definition downgradient of East Trenches	no water level recorded
04591	VOP definition downgradient of East Trenches	static water level is 43 ft on 10/2/91
04691	VOP definition downgradient of East Trenches	no water level recorded
04891	Evaluate influence of East Spray field Sites on groundwater flow and quality	static water level is at 40 ft on 11/1/91
04991	Evaluate influence of East Spray field Sites on groundwater flow and quality	static water levels are 39.6 ft on 9/20/91 and 39.9 ft on 11/1/91
05091	Evaluate influence of East Spray field Sites on groundwater flow and quality	no static water level recorded
05191	Evaluate influence of East Spray field Sites on groundwater flow and quality	static water level is at 41.7 ft on 11/1/91
05291	Evaluate influence of East Spray field Sites on groundwater flow and quality	no water level recorded
05391	VOP definition & extent of saturation downgradient of East Trenches	static water levels are at 26 ft (9/20/91) and 33.5 ft (11/1/91)
05691	Monitor groundwater quality downgradient of Trench T-4	static water levels are at 26.3 ft (10/7/91) and 27.5 ft (11/1/91)
05991	Monitor groundwater quality downgradient of 903 Pad & Reactive Metal Site	
06091	Monitor groundwater quality downgradient of East Trenches Area	static water level is at 35.4 on 11/1/91
06191	Monitor groundwater quality downgradient of East Trenches Area	static water level is 27 ft on 1/3/92
06291	VOP definition & extent of saturation downgradient of East Trenches Area	static water level is at 34.9 on 9/6/91
06391	VOP definition & extent of saturation downgradient of East Trenches Area	static water level is at 21.8 on 11/1/91
06491	VOP definition & extent of saturation downgradient of East Trenches Area	no water level recorded
06591	Groundwater characterization upgradient of 903 Pad	no water level recorded
06691	Monitor groundwater quality beneath 903 Pad	no water level recorded
06791	Monitor groundwater quality downgradient of 903 Pad	no water level recorded
06891	Monitor groundwater quality downgradient of 903 Pad	no water level recorded
06991	Monitor groundwater quality downgradient of 903 Pad	water level 19 ft on 2/27/92
07191	Monitor groundwater quality downgradient of 903 Pad	water level 17.5 ft on 3/13/92
07291	Monitor groundwater. quality downgradient of 903 Pad, upgradient of Trench T-2	no water level recorded
07391	Monitor groundwater quality downgradient of Trench T-2	no water level recorded

266

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
07891					OU2	O	9	749653.097	2087041.293	Active	CERCLA
07991				SE TRENCHES	OU2	O	9	749541.117	2087442.738	Active	CERCLA
08091				SE TRENCHES	OU2	O	9	749671.337	2087794.553	Active	CERCLA
08291					OU2	O	9	749586.383	2087832.485	Active	CERCLA
08391					OU2	P	9	749606.513	2088034.176	Active	CERCLA
08491					OU2	O	9	749506.154	2087871.842	Active	CERCLA
08591					OU2	P	9	749525.556	2088005.772	Active	CERCLA
08891					OU2	M	9	749127.653	2085866.385	Active	CERCLA
09091				903 Pad.	OU2	M	8	748918.298	2085943.418	Active	CERCLA
09691					OU2	N	8	748571.859	2086038.212	Active	CERCLA
10991					OU2	P	9	749628.505	2088678.597	Active	CERCLA
11291					OU2	P	10	750391.102	2088967.780	Active	CERCLA
11491					OU2	O	10	750034.627	2087628.357	Active	CERCLA
11691					OU2	O	10	750188.348	2087182.233	Active	CERCLA
11791					OU2	N	8	748900.083	2086785.865	Active	CERCLA
11891					OU2	N	10	750032.642	2086999.213	Active	CERCLA
12091					OU2	N	9	749436.402	2086008.992	Active	CERCLA
12191					OU2	N	9	749774.196	2086949.375	Active	CERCLA
12291					OU2	M	9	749428.771	2085440.898	Active	CERCLA
12391					OU2	P	10	750176.198	2088272.545	Active	CERCLA
12491					OU2	O	10	750058.247	2087588.365	Active	CERCLA
12691					OU2	O	9	749952.141	2087419.367	Active	CERCLA
12891				SE TRENCHES	OU2	P	9	749695.618	2088031.615	Active	CERCLA
12991					OU2	N	9	749208.513	2086624.563	Active	CERCLA
13091				903 PAD	OU2	M	8	748960.124	2085991.641	Active	CERCLA
13191					OU2	M	9	749071.198	2085530.422	Active	CERCLA
13291					OU2	M	9	749059.763	2085523.189	Active	CERCLA
13391				NE TRENCHES	OU2	Q	10	750922.467	2089163.907	Active	CERCLA
13491					OU2	N	9	749488.539	2086731.841	Active	CERCLA
13591					OU2	N	9	749204.435	2086611.776	Active	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
07891	Monitor groundwater quality beneath Trench T-11	no water level recorded
07991	Monitor groundwater quality beneath Trench T-9	no water level recorded
08091	Monitor groundwater quality beneath Trench T-5	no water level recorded
08291	Monitor groundwater quality beneath Trench T-7	no water level recorded
08391	Monitor groundwater quality beneath Trench T-7	no water level recorded
08491	Monitor groundwater quality beneath Trench T-8	no water level recorded
08591	Monitor groundwater quality beneath Trench T-8	no water level recorded
08891	Source characterization beneath 903 Pad	water level 22 ft on 3/3/92
09091	Source characterization beneath 903 Pad	water level 20.2 on 3/16/92
09691	Source characterization beneath Reactive Metal Destruction site	no water level recorded
10991	Source characterization beneath East Spray Field	water level 50.9 on 12/19/91
11291	Paired to Well 6091 due to saturated thickness*, East Trenches	water level 25 ft on 9/18/91
11491	Paired to Well 5691 due to saturated thickness*, East Trenches	water level 25.7 ft on 11/1/91 and 26.8 ft on 10/9/91
11691	Paired to Well 3791 due to saturated thickness*, East Trenches	water level 29.1 on 11/15/91 and 32.1 ft on 1/7/92
11791	Paired to Well 0391 due to saturated thickness*, 903 Pad	no water level recorded
11891	Paired to Well 3391 due to saturated thickness*, East Trenches	water level 28.2 ft on 1/7/92 and 28.3 ft on 10/23/91
12091	Paired to Well 1891 due to saturated thickness*, Mound	water level 16.2 ft on 11/19/91 and 16.8 ft on 1/6/92
12191	Paired to Well 2991 due to saturated thickness*, East Trenches	water level 24.7 on 11/27/91 and 25.2 ft on 1/7/92
12291	Paired to Well 1491 due to saturated thickness*, Mound	water level 13 ft on 12/5/91
12391	Paired to Well 5391 due to saturated thickness*, East Trenches	water level 34.4 ft on 12/23/91
12491	Paired to Well 5691 due to saturated thickness*, East Trenches	water level 29 ft on 12/27/91
12691	Paired to Well 3191 due to saturated thickness*, East Trenches	water level 47.5 ft on 1/3/92
12891	Monitor groundwater quality beneath Trench T5, replaced Well 8191	no water level reported
12991	Paired to Well 0291 due to saturated thickness*, 903 Pad	no water level frported
13091	Monitor groundwater quality downgradient of 903 Pad, Replaced Well 7091	no water level reported
13191	Paired to Well 6591 due to saturated thickness*, 903 Pad	water level 16.3 on 3/11/92
13291	Paired to Well 6591 due to saturated thickness*, 903 Pad	
13391	Paired to Well 2591 due to saturated thickness*, East Trenches	
13491	Paired to Well 1991 due to saturated thickness*, East Trenches	
13591	Paired to Well 0291 due to saturated thickness*, 903 Pad	

268

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
20091				NE TRENCHES	OU2	O	10	750055.576	2087602.728	Abandoned	Special Purpose
20191				NE TRENCHES	OU2	O	10	750061.236	2087610.418	Inactive	Special Purpose
20291				NE TRENCHES	OU2	O	10	750052.405	2087612.419	Inactive	Special Purpose
20491					OU2	O	10	750050.574	2087600.794	Inactive	Special Purpose
20591					OU2	N	9	749404.733	2086316.408	Inactive	Special Purpose
20691					OU2	N	9	749410.509	2086317.243	Inactive	Special Purpose
20791				NE TRENCHES	OU2	N	9	749416.040	2086317.611	Inactive	Special Purpose
20991					OU2	O	9	749970.901	2087286.681	Inactive	Special Purpose
21091				NE TRENCHES	OU2	O	9	749997.079	2087282.137	Inactive	Special Purpose
21191					OU2	O	10	750059.984	2087598.922	Inactive	Special Purpose
30991					OU1	M	7	747744.752	2085294.593	Active	CERCLA
31491					OU1	L	7	747749.218	2084648.523	Active	CERCLA
31791					OU1	L	7	747424.743	2084275.994	Active	CERCLA
31891					OU1	L	7	747661.131	2084142.415	Active	CERCLA
32591					OU1	L	7	747976.354	2084852.359	Active	CERCLA
33491					OU1	L	8	748079.768	2084882.881	Active	CERCLA
33691					OU1	L	8	748111.686	2084994.482	Active	CERCLA
33891					OU1	L	7	747960.624	2084640.646	Active	CERCLA
34591					OU1	M	8	748462.138	2085620.562	Active	CERCLA
34791					OU1	M	8	748376.515	2085521.155	Active	CERCLA
35391					OU1	K	8	748010.739	2083907.004	Active	CERCLA
35691					OU1	L	7	747796.960	2084005.362	Active	CERCLA
35991					OU1	K	8	748056.656	2083755.841	Active	CERCLA
36191					OU1	L	8	748090.934	2084198.473	Active	CERCLA
36391					OU1	L	8	748042.112	2084293.958	Active	CERCLA
36691					OU1	L	8	748026.764	2084421.059	Active	CERCLA
36991					OU1	L	8	748179.743	2084177.366	Active	CERCLA
37191					OU1	L	8	748036.415	2084533.460	Active	CERCLA
37591					OU1	L	8	748579.715	2084610.427	Active	CERCLA
37691					OU1	M	8	748691.914	2085217.139	Active	CERCLA

269

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
20091	Bedrock Pumping Well	
20191	Bedrock Observation Well	
20291	Alluvial Observation Well	
20491	Alluvial Observation Well	
20591	Alluvial Observation Well	
20691	Bedrock Pumping Well	
20791	Bedrock Observation Well	
20991	Bedrock Observation Well	
21091	Bedrock Observation Well	
21191	Bedrock Observation Well	
30991	Monitor groundwater quality downgradient of Woman Creek Alluvium	
31491	Monitor groundwater quality & flow, South Intercepter Ditch	
31791	Monitor groundwater quality downgradient of IHSS 102	
31891	Monitor groundwater quality beneath OU1	
32591	Monitor groundwater quality downgradient of IHSS 119.1	
33491	Monitor groundwater quality downgradient of IHSS 119.1	
33691	Monitor groundwater quality downgradient of IHSS 119.1	
33891	Monitor groundwater quality downgradient of IHSS 119.1	
34591	Monitor groundwater quality downgradient of IHSS 119.2	
34791	Monitor groundwater quality downgradient of IHSS 119.2	
35391	Monitor groundwater quality downgradient of IHSS 177	
35691	Monitor groundwater quality downgradient of IHSS 107	
35991	Monitor groundwater quality downgradient of IHSS 145	
36191	Monitor groundwater quality downgradient of IHSS 103	
36391	Monitor groundwater quality downgradient of IHSS 130	
36691	Monitor groundwater quality downgradient of IHSS 130	
36991	Monitor groundwater quality beneath IHSS 103	
37191	Monitor groundwater quality downgradient of IHSS 130	
37591	Monitor groundwater quality upgradient OU1	
37691	Monitor groundwater quality upgradient OU1	

270

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
37791					OU1	K	8	748591.769	2083753.417	Active	CERCLA
37891					OU1	L	8	748075.026	2084915.435	Active	CERCLA
37991					OU1	L	8	748063.066	2084731.013	Active	CERCLA
38191					OU1	L	8	748013.797	2084765.212	Active	CERCLA
38291					OU1	L	8	748031.510	2084801.073	Active	CERCLA
38591					OU1	L	7	747407.902	2084658.876	Active	CERCLA
38891					OU1	M	7	747830.446	2085051.120	Active	CERCLA
38991					OU1	M	7	747820.424	2085024.055	Inactive	CERCLA
39191					OU1	L	8	748009.177	2084920.915	Active	CERCLA
39291					OU1	L	7	747948.507	2084973.721	Inactive	CERCLA
39691					OU1	K	8	748356.958	2083634.456	Active	CERCLA
39991	MW-1-92				OU1	K	7	747688.810	2083971.770	Abandoned	CERCLA
40491						U	10	750544.700	2093762.900	Active	Boundary
40791						U	6	746282.600	2093524.800	Active	Boundary
40991					OU6	O	12	752162.600	2087538.300	Active	CERCLA
41091					OU6	Q	13	753241.400	2089994.400	Active	CERCLA
41491						U	4	744915.500	2093974.500	Active	Boundary
41591						U	8	748799.800	2093914.000	Active	Boundary
41691						U	13	753470.300	2093851.200	Active	Boundary
45091				Windsite.	BG	D	17	757431.000	2076976.000	Active	Background
45191				Windsite.	BG	D	17	757407.000	2076503.000	Active	Background
45291				Windsite.	BG	D	17	757760.000	2076728.000	Active	Background
45391	MW-2-92				OU1	L	7	747791.160	2084847.380	Active	CERCLA
03092	MW-92-1					G	10	750834.426	2079650.724	Active	Special Purpose
03192	MW-92-2					G	10	751084.171	2079054.018	Active	Special Purpose
10092					OU1	M	7	747942.190	2085296.160	Active	CERCLA
10192					OU1	L	7	747687.010	2084095.850	Active	CERCLA
10292					OU1	L	7	747691.770	2084106.120	Active	CERCLA
10392					OU1	K	7	747677.470	2083820.300	Active	CERCLA
10492					OU1	K	7	747677.900	2083812.380	Active	CERCLA

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
37791	Monitor groundwater quality upgradient OU1	
37891	Groundwater flow from IHSS 119.1, 130 & further investigate TDS from Well 0587	
37991	Groundwater flow from IHSS 119.1, 130 & further investigate TDS from Well 0587	
38191	Piezometer for water level measurement near IHSS 119.1	
38291	Piezometer for water level measurement near IHSS 119.1	
38591 /MEM	Monitor groundwater quality downgradient of Woman Creek Alluvium	
38891	Colluvium saturation downgradient of French Drain	
38991	Bedrock saturation downgradient of French Drain	
39191	Groundwater flow from. IHSS 119.1 & 130, further investigate TDS from Well 0587	
39291	Bedrock saturation upgradient of French Drain	
39691	Monitor groundwater quality upgradient of OU1	
39991	Monitor groundwater quality French Drain	
40491	Boundary Monitor Well replaced Well 0386	ASI computer log for TOB.
40791	Boundary Monitor Well replaced Well 0386	Used last well from Hollow Stem Auger Field Activities Report for TOB.
40991	Boundary Monitor Well replaced Well 1286	Used ASI original log by F.Grigsby for TOB.
41091	Boundary Monitor Well replaced Well 1186	Used ASI original log by F.Grigsby for TOB.
41491	Boundary Monitor Well replaced Well 0186	Used Hollow Stem Auger... Report (11/6/91) for TOB.
41591	Boundary Monitor Well replaced Well 0286	Used Groundwater Monitoring Well and Piezometer Report for TOB.
41691	Boundary Monitor Well replaced Well 0486	
45091	Background groundwater characterization, northwest portion of plantsite	
45191	Background groundwater characterization, northwest portion of plantsite	
45291	Background groundwater characterization, northwest portion of plantsite	
45391	Groundwater monitor downgradient of 881 Hillside French Drain	
03092	Monitor perched groundwater beneath Proposed Landfill	
03192	Monitor perched groundwater beneath Proposed Landfill	
10092	Groundwater monitoring downgradient of 881 Hillside French Drain	
10192	Groundwater monitoring downgradient of 881 Hillside French Drain	
10292	Groundwater monitoring downgradient of 881 Hillside French Drain	
10392	Groundwater monitoring downgradient of 881 Hillside French Drain	
10492	Groundwater monitoring downgradient of 881 Hillside French Drain	

272

Appendix B
Well Location, Status, and Purpose

Well Name	Old Well Name	Old Well Name	Old Well Name	Area	OU	RFP Loc		State North	State East	Well Status	Well Classification
10592					OU1	K	7	747715.760	2083724.790	Active	CERCLA
10692					OU1	K	7	747744.860	2083637.560	Active	CERCLA
10792					OU1	L	7	747722.930	2084363.370	Active	CERCLA
10892					OU1	K	7	747670.520	2083927.510	Active	CERCLA
10992					OU1	L	7	747774.610	2084779.550	Active	CERCLA
11092					OU1	M	7	747842.090	2085079.260	Active	CERCLA
43392					BG	I	8	748034.450	2081536.760	Active	Background
43492					BG	O	3	743669.640	2087281.400	Active	Background
46192					OU11	D	8	748821.920	2076092.120	Active	RCRA
46292					OU11	F	9	749430.050	2078127.910	Active	RCRA
46392					OU11	G	9	749986.910	2079666.930	Active	RCRA-C
46492					OU11	H	9	749746.510	2080245.130	Active	CERCLA
46692					OU2	O	9	749554.330	2087076.570	Active	CERCLA
46792					OU2	O	9	749538.400	2087080.330	Active	CERCLA
46892					OU2	O	9	749524.350	2087086.790	Active	CERCLA
P1-92								751950.000	2084200.000	Inactive	Special Purpose
P2-92								752050.000	2084600.000	Inactive	Special Purpose
00393										Active	RCRA
00493										Active	RCRA
05093										Active	RCRA
05193										Active	RCRA
05293										Active	RCRA
05393										Active	RCRA

273

Appendix B
Well Location, Status, and Purpose

Well Name	Purpose	Comments
10592	Groundwater monitoring downgradient of 881 Hillside French Drain	
10692	Groundwater monitoring downgradient of 881 Hillside French Drain	
10792	Groundwater monitoring downgradient of 881 Hillside French Drain	
10892	Groundwater monitoring downgradient of 881 Hillside French Drain	
10992	Groundwater monitoring downgradient of 881 Hillside French Drain	
11092	Groundwater monitoring downgradient of 881 Hillside French Drain	
43392	Background Characterization	
43492	Background Characterization	
46192	WARP (Well Abandonment & Replacement Program) replaced Wells 1081 & 0782	
46292	WARP (Well Abandonment & Replacement Program) replaced Wells 0586 & 0686	
46392	WARP (Well Abandonment & Replacement Program) replaced Wells 0881 & 0981	
46492	WARP (Well Abandonment & Replacement Program) replaced Well 0382	
46692	WARP (Well Abandonment & Replacement Program) replaced Well 2274	
46792	WARP (Well Abandonment & Replacement Program) replaced Well 2274	
46892	WARP (Well Abandonment & Replacement Program) replaced Well 2274	
P1-92	Piezometers to monitor groundwater elevation near Solar Pond modular tank facility; 31' perforated well screen, approximately 39' deep	
P2-92	Piezometers to monitor groundwater elevation near Solar Pond modular tank facility; 31' perforated well screen, approximately 39' deep	
00393	Replacement for Well 6787	
00493	Replacement for Well B206389	
05093	Replacement for Well 2886	
05193	Replacement for Well 3787	
05293	Replacement for Well P207489	
05393	Replacement for Well P210289	

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
1-774-00								0.00	0.00	0		
2-774-00								0.00		0		
1-776-00								0.00		0		
2-776-00								0.00		0		
WS01	Alluvium?		5993.52	5994.54				5994.54		5993.52		
WS02	Alluvium?		5966.01	5965.80				5965.80		5966.01		
WS03	Alluvium?		5976.90	NONE				0.00		5976.9		
0154	Alluvium							0.00		0		
0254	Alluvium							0.00		0		
0354	Alluvium							0.00		0		
0160	Bedrock?		5905.90					0.00		5905.9		
0260	Bedrock?		5934.60	5935.01				5935.01		5934.6		
0360	Bedrock?		5957.20					0.00		5957.2		
0460	Bedrock?		5962.00	5972.72				5972.72		5962		
0560	Bedrock?		5966.40					0.00		5966.4		
0660	Bedrock?		5972.60					0.00		5972.6		
0166	Bedrock?		6054.50					0.00		6054.5		
0266	Bedrock?		5949.40					0.00		5949.4		
0366	Bedrock?		5957.10					0.00		5957.1		
0168	Alluvium?		5977.20					0.00		5977.2		
0268	Alluvium?		5979.60					0.00		5979.6		
0368	Alluvium?		5974.50					0.00		5974.5		
0468	Alluvium?		5973.30					0.00		5973.3		
0171	Bedrock?		5950.00	5950.83				5950.83		5950		
0271	Bedrock?		5936.20	5936.79				5936.79		5936.2		
0371	Bedrock?		5819.10					0.00		5819.1		
0471	Bedrock?		5818.60					0.00		5818.6		
0571	Bedrock?		5830.30					0.00		5830.3		
0671	Bedrock?		5906.00	5908.78				5908.78		5906		
2-441-71								0.00		0		
3-707-71								0.00		0		
2-774-71								0.00		0		
5-779-71								0.00		0		
7-779-71								0.00		0		
1-865-71								0.00		0		
2-865-71								0.00		0		
2-889-71								0.00		0		
0174	Bedrock?		5968.00	5968.80				5968.80		5968		
0374	Bedrock?		5950.20	5951.31				5951.31		5950.2		
0474	Bedrock?		5951.10					0.00		5951.1		
0574	Bedrock?		5948.10					0.00		5948.1		
0674	Bedrock?		5948.50					0.00		5948.5		
0774	Bedrock?		5946.50	5946.98				5946.98		5946.5		

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
0874	Alluvium?		5947.60	5947.95				5947.95		5947.6		
0974	Bedrock?		5925.10	5926.25				5926.25		5925.1		
1074	Alluvium?		5925.80	5925.91				5925.91		5925.8		
1374	Bedrock?		5991.70					0.00		5991.7		
1474	Alluvium?		5993.30	5994.49				5994.49		5993.3		
1574	Bedrock?		5765.70					0.00		5765.7		
1674	Alluvium?		5767.40	5768.63				5768.63		5767.4		
1774	Bedrock?		5810.90					0.00		5810.9		
1874	Bedrock?		5812.80					0.00		5812.8		
2174	Bedrock?		6026.60					0.00		6026.6		
2274	Bedrock?		5956.80	5957.49				5957.49		5956.8		
3-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
4-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
5-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
13-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
14-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
15-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
20-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
24-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
25-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
26-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
27-SEP-74								0.00		0		
								0.00		0		

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
								0.00		0		
31-SEP-74								0.00		0		
								0.00		0		
								0.00		0		
0181	Bedrock?		5718.90	5720.96				5720.96		5718.9		
0281	Bedrock?		5722.90	5724.85				5724.85		5722.9		
0381	Bedrock?		5808.40					0.00		5808.4		
0481	Alluvium?		5944.30	5945.39				5945.39		5944.3		
0581	Bedrock?		5945.30					0.00		5945.3		
0681	Bedrock?		6004.40	6005.70				6005.70		6004.4		
0781	Bedrock?		6004.10	6006.06				6006.06		6004.1		
0881	Bedrock?		6064.50	6065.89				6065.89		6064.5		
0981	Alluvium?		6063.50	6065.18				6065.18		6063.5		
1081	Alluvium?		6142.60	6144.71				6144.71		6142.6		
0182	Bedrock?		5910.70					0.00		5910.7		
0282	Bedrock?		5911.00					0.00		5911		
0382	Alluvium?		6047.90	6049.56				6049.56		6047.9		
0482	Alluvium?		6076.30	6077.74				6077.74		6076.3		
0582	Alluvium?		6096.10	6097.69				6097.69		6096.1		
0682	Alluvium?		6097.40	6098.58				6098.58		6097.4		
0782	Alluvium?		6143.30	6145.83				6145.83		6143.3		
0186	Alluvium	Qa?	5627.67	5629.32	3.19	10.20	9.3	5626.13	5619.12	5618.37	claystone	CL
0286	Alluvium	Qc	5725.01	5726.10	3.20	9.01	7.8	5722.90	5717.09	5717.21	silty claystone	CL
0386	Bedrock	Kss	5676.24	5677.86	10.36	23.67	8.0	5667.50	5654.19	5668.24	sandy claystone	CL
0486	Alluvium	Qa?	5643.86	5644.91	3.52	14.92	14.0	5641.39	5629.99	5629.86	sandy claystone	
0586	Alluvium	Qc?	5724.38	5726.37	4.40	9.76	9.0	5721.97	5716.61	5715.38	claystone	
0686	Alluvium	Qc	5814.68	5816.72	3.28	8.88	10.5	5813.44	5807.84	5804.18	claystone	CH
0786	Alluvium	Qc	5924.94	5926.54	3.00	5.74	5.0	5923.54	5920.80	5919.94	silty claystone	CH
0886	Bedrock	Ksslt	5925.60	5926.90	59.08	63.79	1.0	5867.82	5863.11	5924.6	claystone	CL
0986	Bedrock	Kss & Ksslt	5996.39	5998.23	122.57	135.35	30.3	5875.66	5862.88	5966.09	claystone	GC
1086	Alluvium	Qrf	5996.62	5998.19	3.29	23.78	23.0	5994.90	5974.41	5973.62	?	
1186	Alluvium	Qa	5718.04	5720.09	3.94	10.25	9.5	5716.15	5709.84	5708.54	claystone	CL
1286	Alluvium	Qa?	5785.88	5788.03	2.04	11.30	11.0	5785.99	5776.73	5774.88	silty claystone	GC
1386	Alluvium	Qc	5840.47	5842.59	3.09	9.50	9.0	5839.50	5833.09	5831.47	claystone	CH
1486	Bedrock	Kss & Ksclst	5844.71	5846.71	39.42	55.36	11.0	5807.29	5791.35	5833.71	silty claystone	CL
1586	Alluvium	Qc	5848.43	5850.63	4.09	14.44	12.5	5846.54	5836.19	5835.93	silty claystone	GC
1686	Bedrock	Ksltss	5867.92	5869.55	39.06	45.06	7.0	5830.49	5824.49	5860.92	sandy claystone	CL
1786	Alluvium	Qc	5868.43	5869.57	3.73	13.98	12.5	5865.84	5855.59	5855.93	claystone	CL
1886	Alluvium	Qc	5885.75	5887.97	3.74	7.50	8.0	5884.23	5880.47	5877.75	sandy claystone	CH
1986	Alluvium	Kclst	5943.08	5943.86	3.00	12.25	11.5	5940.86	5931.61	5931.58		
2086	Alluvium	fill	5960.47	5962.12	4.21	10.55	12.5	5957.91	5951.57	5947.97	clayey sandstone	
2186	Bedrock	Kss & Ksltclst	6004.76	6005.96	35.00	67.24	15.0	5970.96	5938.72	5989.76	sandy claystone	CL
2286	Alluvium	Qrf	5978.77	5979.55	3.20	11.20	10.5	5976.35	5968.35	5968.27	sandstone	GC

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
2386	Bedrock	Kslt & Ksltclst	5982.46	5982.46	113.00	117.25	8.2	5869.46	5865.21	5974.26		
2486	Alluvium	Qrf	5982.45	5983.56	2.95	7.45	7.2	5980.61	5976.11	5975.25	claystone	CL
2586	Bedrock	Ksltclst & Kclst	5975.24	5977.14	59.90	82.00	8.0	5917.24	5895.14	5967.24	sandy claystone	GW
2686	Alluvium	Qrf	5975.42	5977.17	3.75	11.00	10.5	5973.42	5966.17	5964.92	claystone	GP
2786	Bedrock	Ksslts & Ksclst	5962.89	5963.88	128.50	133.00	11.0	5835.38	5830.88	5951.89	claystone	CH
2886	Alluvium	Qrf	5962.38	5964.38	4.03	8.60	9.5	5960.35	5955.78	5952.88	claystone	CL
2986	Alluvium	Qrf	5959.58	5960.68	2.83	8.77	8.5	5957.85	5951.91	5951.08	claystone	CH
3086	Bedrock	Kclst	5957.42	5958.39	2.48	14.93	2.5	5955.91	5943.46	5954.92	claystone	CL
3186	Bedrock	Kss & Kslt	5964.98	5967.05	2.46	17.32	0.5	5964.59	5949.73	5964.48	sandstone	CL
3286	Bedrock	Kss & Ksltss	5966.08	5967.92	114.90	125.50	1.0	5853.02	5842.42	5965.08	sandstone	CL
3386	Alluvium	Qrf	5951.40	5952.42	2.99	7.34	6.8	5949.43	5945.08	5944.6	claystone	GC
3486	Bedrock	Kcss & Kcslt	5912.00	5913.95	44.24	56.25	16.0	5869.71	5857.70	5896	silty claystone	GC
3586	Alluvium	Qc	5910.75	5912.76	4.86	11.60	10.5	5907.90	5901.16	5900.25	clayey siltstone	CL
3686	Alluvium	Qc	5883.69	5885.22	3.50	6.49	5.5	5881.72	5878.73	5878.19	claystone	CL
3786	Alluvium	Qc	5796.61	5798.26	3.29	8.55	7.5	5794.97	5789.71	5789.11	claystone	CL
3886	Alluvium	Qa	5734.05	5736.08	2.91	8.50	6.0	5733.17	5727.58	5728.05	claystone	GC
3986	Alluvium	Qrf	5908.23	5909.41	5.00	31.50	30.5	5904.41	5877.91	5877.73	silty claystone	GC
4086	Bedrock	Kclst	5943.85	5944.89	87.98	111.50	45.0	5856.91	5833.39	5898.85		
4186	Alluvium	Qrf	5942.62	5944.36	3.90	44.70	45.7	5940.46	5899.66	5896.92	claystone	GC
4286	Alluvium	Qrf	5956.27	5957.87	6.12	29.70	28.3	5951.75	5928.17	5927.97	silty claystone	SW
4386	Alluvium	Qrf	5972.91	5974.46	3.99	16.75	17.0	5970.47	5957.71	5955.91	sandstone	ML
4486	Alluvium	Qrf	6019.93	6021.96	3.23	26.25	25.5	6018.73	5995.71	5994.43	silty claystone	GW
4586	Alluvium	Qrf	6049.99	6051.55	2.99	48.20	49.7	6048.56	6003.35	6000.29		SP
4686	Bedrock	Kslt & Kcslt	6081.99	6083.99	140.33	160.79	90.0	5943.66	5923.20	5991.99		
4786	Alluvium	Qrf	6081.90	6083.67	6.23	94.49	93.0	6077.44	5989.18	5988.9		
4886	Bedrock	Ksslt & Kcslt	6097.14	6099.10	191.99	207.07	70.0	5907.11	5892.03	6027.14		
4986	Alluvium	Qrf	6097.37	6098.89	4.10	67.60	68.0	6094.79	6031.29	6029.37	claystone	SP
5086	Alluvium	Qrf	6121.04	6122.94	2.90	96.15	98.0	6120.04	6026.79	6023.04	claystone	GP
5186	Alluvium	Qrf	6142.37	6144.25	4.83	79.06	78.5	6139.42	6065.19	6063.87	claystone	CL
5286	Bedrock	Kss & Ksltclst	6142.14	6144.44	92.00	125.80	72.0	6052.44	6018.64	6070.14		
5386	Alluvium	Qrf	6065.75	6066.63	2.50	7.80	7.0	6064.13	6058.83	6058.75		
5486	Bedrock	Ksslt & Kslt	6116.48	6117.62	75.43	85.24	36.0	6042.19	6032.38	6080.48		
5586	Alluvium	Qrf	6116.64	6118.72	3.55	36.39	35.5	6115.17	6082.33	6081.14	claystone	CL
5686	Alluvium	Qc	5987.46	5988.93	2.60	9.60	9.0	5986.33	5979.33	5978.46	claystone	ML
5786	Alluvium	Qc	5951.46	5952.88	2.50	6.50	6.0	5950.38	5946.38	5945.46	silty claystone	
5886	Alluvium	Qc	5895.21	5897.65	1.50	3.50	3.0	5896.15	5894.15	5892.21	claystone	
5986	Bedrock	Kss & Kcslt	5920.30	5921.90	19.00	28.00	7.5	5902.90	5893.90	5912.8	sandy claystone	CL
5986R	Alluvium	Qc	5919.88	5921.54	20.10	28.60	29.5	5901.44	5892.94	5890.38	claystone	
6086	Alluvium	Qc	5915.42	5921.68			9.0	0.00		5906.42	claystone	CL
6186	Alluvium	Qrf	5999.47	6000.60	5.00	12.00	11.5	5995.60	5988.60	5987.97	silty claystone	GC
6286	Bedrock	Ksltss & Kcss	5902.01	5903.18	25.22	35.19	22.0	5877.96	5867.99	5880.01	claystone	SC
6386	Alluvium	Qc	5901.09	5902.01	3.80	15.25	14.8	5898.21	5886.76	5886.29	claystone	CL
6486	Alluvium	Qa	5839.06	5841.05	3.41	9.00	8.5	5837.64	5832.05	5830.56	claystone	CL

278

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
6586	Alluvium	Qa	5786.66	5788.27	2.50	8.00	7.1	5785.77	5780.27	5779.56	claystone	
6686	Alluvium	Qa	5692.57	5694.20	2.50	6.50	5.8	5691.70	5687.70	5686.77		
6786	Alluvium	Qc	5802.33	5803.97	2.50	14.75	14.0	5801.47	5789.22	5788.33		
6886	Alluvium	Qc?	5887.97	5890.49	1.50	3.50	2.8	5888.99	5886.99	5885.17	claystone	GM
6986	Alluvium	Qc	5921.46	5922.52	3.00	14.00	14.5	5919.52	5908.52	5906.96	claystone	CL
7086	Alluvium	Qc?	5937.69	5939.39	2.36	7.90	7.0	5937.03	5931.49	5930.69	claystone	GC
0187	Alluvium	fill	5992.49	5994.08	3.38	11.83	11.8	5990.70	5982.25	5980.69	claystone	
0287	Alluvium	Qc	5930.99	5932.53	3.22	10.08	7.2	5929.31	5922.45	5923.79	claystone	CH
0387	Bedrock	Ksslt & Kcslt	5930.58	5932.44	102.80	109.75	20.8	5829.64	5822.69	5909.78	claystone	CL
0487	Alluvium	Qc	5910.12	5911.58	3.51	19.47	19.7	5908.07	5892.11	5890.42	claystone	GC
0587	Bedrock	Kss & Ksltss	5927.85	5929.99	42.00	51.25	11.0	5887.99	5878.74	5916.85	claystone	GC
0687	Alluvium	Qc	5904.76	5906.32	3.56	6.88	6.5	5902.76	5899.44	5898.26	clayey siltstone	CL
0887	Bedrock	Ksltclst & Kclst	5919.95	5921.55	84.00	89.02	8.7	5837.55	5832.53	5911.25		
0987	Bedrock	Kss	5980.22	5981.70	14.50	32.15	12.5	5967.20	5949.55	5967.72		
1087	Alluvium	Qrf	5981.95	5983.52	3.50	12.00	11.3	5980.02	5971.52	5970.65	silty sandstone	GP
1187	Bedrock	Kcss	5913.60	5915.12	15.20	20.25	5.2	5899.92	5894.87	5908.4	claystone	CH
1287	Bedrock	Kcslt	5934.81	5936.30	4.91	10.01	3.5	5931.39	5926.29	5931.31	claystone	CH
1487	Bedrock	Kss & Kslt	5854.98	5856.56	19.00	24.05	5.2	5837.56	5832.51	5849.78	claystone	CL
1587	Alluvium	Qrf	5971.27	5972.79	5.80	22.06	21.9	5966.99	5950.73	5949.37	silty claystone	GW
1687	Bedrock	Kslt	5969.49	5970.79	100.00	125.00	22.2	5870.79	5845.79	5947.29	claystone	GC
1787	Alluvium	Qrf	5968.01	5969.56	3.50	25.50	25.0	5966.06	5944.06	5943.01	silty claystone	GC
1887	Bedrock	Kss & Ksslt	5967.99	5969.49	127.00	133.45	25.2	5842.49	5836.04	5942.79		
1987	Alluvium	Qrf	5968.44	5969.91	3.50	11.65	10.8	5966.41	5958.26	5957.64	silty claystone	GC
2087	Bedrock	Ksltclst	5968.66	5970.14	107.26	116.11	11.8	5862.88	5854.03	5956.86	claystone	GC
2187	Alluvium	Qc	5928.43	5929.69	3.26	10.41	8.0	5926.44	5919.29	5920.43	claystone	CL
2287	Bedrock	Kss & Kslt	5931.18	5932.80	81.41	88.46	12.8	5851.39	5844.34	5918.38	claystone	CL
2387	Bedrock	Ksltss & Kclst	5972.79	5974.49	17.19	37.61	15.2	5957.30	5936.88	5957.59	sandy claystone	GP
2487	Alluvium	Qrf	5958.29	5959.69	3.50	13.60	15.1	5956.19	5946.09	5943.19	clayey siltstone	ML
2587	Bedrock	Ksltss & Kss	5959.48	5960.98	17.50	43.45	16.5	5943.48	5917.53	5942.98	sandy claystone	CL
2687	Alluvium	Qrf	5954.28	5955.90	4.00	13.45	14.5	5951.90	5942.45	5939.78	claystone	CH
2787	Alluvium	Qrf	5947.80	5949.65	3.50	43.00	44.2	5946.15	5906.65	5903.6	claystone	CL
2887	Bedrock	Kslt & Kclst	5947.56	5949.90	187.37	197.37	43.5	5762.53	5752.53	5904.06		GP
2987	Alluvium	Qc	5812.61	5814.29	3.50	20.30	19.8	5810.79	5793.99	5792.81	silty claystone	CL
3087	Bedrock	Kcslt	5810.12	5811.77	85.79	94.35	16.0	5725.98	5717.42	5794.12		
3187	Bedrock		5945.31	5947.46	110.66	129.41	45.0	5836.80	5818.05	5900.31	silty claystone	GC
3287	Alluvium	Qrf	5946.38	5947.97	36.03	46.58	46.0	5911.94	5901.39	5900.38	silty claystone	GC
3387	Alluvium	Qrf	5945.78	5947.22	15.00	20.00	19.0	5932.22	5927.22	5926.78	clayey siltstone	GW
3487	Bedrock	Ksltclst & Kslt	5945.60	5947.22	97.29	104.24	20.0	5849.93	5842.98	5925.6	claystone	
3587	Alluvium	Qrf	5949.96	5951.39	3.50	9.35	9.1	5947.89	5942.04	5940.86	silty claystone	CL
3687	Bedrock	Kss & Kslt & Kclst	5949.67	5951.11	19.80	63.35	7.4	5931.31	5887.76	5942.27	claystone	SP
3787	Alluvium	Qrf	5967.52	5968.99	3.50	8.77	8.0	5965.49	5960.22	5959.52	claystone	CL
3887	Alluvium	Qrf	5972.15	5973.90	3.50	9.27	7.8	5970.40	5964.63	5964.35	silty claystone	CALICHE
3987	Bedrock	Ksslt & Kclst	5946.95	5948.42	109.99	117.14	3.5	5838.43	5831.28	5943.45	claystone	CH

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
4087	Alluvium	Qc	5883.00	5884.61	3.50	6.46	5.8	5881.11	5878.15	5877.2	clayey siltstone	ML
4187	Bedrock	Ksltss	5882.95	5884.49	81.21	12.58	3.5	5803.28	5871.91	5879.45	silty claystone	CL
4287	Bedrock	Qc	5854.34	5855.87	3.00	6.36	6.1	5852.87	5849.51	5848.24	slitstone	CL
4387	Alluvium	Qc	5925.06	5926.41	3.50	12.25	12.0	5922.91	5914.16	5913.06	silty claystone	
4487	Alluvium	Qc	5949.63	5951.10	1.40	3.40	3.2	5949.70	5947.70	5946.43	claystone	CL
4587	Bedrock	Kss & Kslt & Kclst	5949.32	5950.91	89.50	97.05	4.0	5861.41	5853.86	5945.32	claystone	
4787	Alluvium	Qc	5882.76	5884.64	3.50	7.25	9.0	5881.14	5877.39	5873.76	silty claystone	CL
4887	Alluvium	Qc	5909.67	5911.41	3.50	9.05	10.0	5907.91	5902.36	5899.67	claystone	CL
4987	Alluvium	Qc	5912.66	5914.27	1.80	4.75	9.0	5912.47	5909.52	5903.66	claystone	
5087	Alluvium	Qc	5933.14	5934.78	3.50	13.50	12.5	5931.28	5921.28	5920.64	clayey siltstone	CH
5187	Alluvium	fill?	5963.27	5965.22	3.58	13.84	12.5	5961.64	5951.38	5950.77	silty claystone	
5287	Alluvium	fill?	5967.85	5969.57	3.50	20.25	20.0	5966.07	5949.32	5947.85		
5387	Alluvium	Qc	5959.99	5961.81	3.50	9.05	10.0	5958.31	5952.76	5949.99	claystone	CL
5487	Alluvium	Qc	5955.85	5957.62	1.33	4.53	4.0	5956.29	5953.09	5951.85	claystone	CH
5587	Alluvium	Qc	5858.39	5860.09	3.35	7.35	5.5	5856.74	5852.74	5852.89	claystone	SC
5687	Alluvium	Qrf	5978.39	5979.77	3.52	9.67	9.4	5976.25	5970.10	5968.99		
5887	Alluvium	Qrf	5995.46	5996.77	3.50	22.26	22.0	5993.27	5974.51	5973.46	silty claystone	CL
5987	Alluvium	Qrf	5992.90	5994.67	3.50	20.75	20.5	5991.17	5973.92	5972.4	claystone	
6087	Alluvium	Qrf	5984.44	5985.96	3.50	27.47	27.0	5982.46	5958.49	5957.44	claystone	CL
6187	Alluvium	Qrf	5984.42	5985.77	3.50	28.24	28.0	5982.27	5957.53	5956.42		
6287	Alluvium	Qrf	5984.54	5986.37	3.50	26.56	26.3	5982.87	5959.81	5958.24	silty claystone	CH
6387	Alluvium	Qrf	5985.63	5987.01	3.50	25.40	25.0	5983.51	5961.61	5960.63	claystone	CL
6487	Alluvium	Qrf	5986.09	5987.34	13.00	23.33	22.0	5974.34	5964.01	5964.09	claystone	SC
6587	Alluvium	Qrf	5983.48	5984.99	10.70	23.96	21.0	5974.29	5961.03	5962.48	sandy claystone	CH
6687	Alluvium	Qrf	5982.26	5983.67	3.40	17.96	15.3	5980.27	5965.71	5966.96	claystone	CH
6787	Alluvium	Qrf	5970.00	5971.76	11.72	16.46	16.4	5960.04	5955.30	5953.6	claystone	MH
6887	Alluvium	Qrf	5968.91	5970.32	11.15	15.75	15.5	5959.17	5954.57	5953.41	silty claystone	GC
7087	Alluvium	Qrf	5966.71	5968.38	3.50	16.26	12.0	5964.88	5952.12	5954.71	silty claystone	CH
7187	Alluvium	Qrf	5963.89	5965.49	3.50	13.51	14.0	5961.99	5951.98	5949.89	claystone	CL
7287	Alluvium	Qrf	5969.60	5971.25	3.50	6.76	8.0	5967.75	5964.49	5961.6	silty claystone	CL
1-EU-88								0.00		0		
2-EU-88								0.00		0		
3-EU-88								0.00		0		
4-EU-88								0.00		0		
5-EU-88								0.00		0		
6-EU-88								0.00		0		
7-EU-88								0.00		0		
8-EU-88								0.00		0		
9-EU-88								0.00		0		
B102289	Alluvium	Qc?	5978.30	5980.06	3.00	12.47	12.5	5977.06	5967.59	5965.8	silty claystone	SM
B102389	Alluvium	Qc	5939.50	5941.18	3.74	10.90	10.4	5937.44	5930.28	5929.1	silty claystone	SM
B106089	Alluvium	Qrf	5993.30	5995.35	3.66	22.40	22.5	5991.69	5972.95	5970.8	claystone	SC
B110889	Alluvium	Qrf	6075.60	6077.77	45.30	63.78	65.0	6032.47	6013.99	6010.6	claystone	SW

280

Appendix C

Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
B110989	Alluvium	Qrf	6082.30	6084.36	46.13	64.61	71.0	6038.23	6019.75	6011.3	claystone	SC
B111189	Alluvium	Qrf	6105.70	6107.52	53.09	72.58	NP	6054.43	6034.94	NP		
P114389	Alluvium	Qrf	5991.20	5993.17	10.10	14.50	14.0	5983.07	5978.67	5977.2	claystone	CL
P114489	Alluvium	Qrf	6033.40	6035.43	44.40	48.80	48.3	5991.03	5986.63	5985.1	claystone	CL
P114589	Alluvium	Qrf	6024.10	6025.90	32.54	36.50	27.5	5993.36	5989.40	5996.6	claystone	CL
P114689	Alluvium	Qrf	6004.00	6005.76	17.83	22.24	22.0	5987.93	5983.52	5982	silty claystone	CL
P114789	Alluvium	Qrf	6010.70	6012.40	21.81	26.23	26.0	5990.59	5986.17	5984.7		
P114889	Alluvium	Qrf	6016.60	6018.26	9.89	14.30	13.8	6008.37	6003.96	6002.8	claystone	CL
P114989	Alluvium	Qrf	6029.80	6031.84	33.59	38.00	37.5	5998.25	5993.84	5992.3	claystone	GC
P115089	Alluvium	Qrf	6038.10	6040.10	36.27	40.70	40.2	6003.83	5999.40	5997.9	claystone	SW
P115189	Alluvium	Qrf	6034.00	Not surv.	31.29	35.71	38.2	0.00		5995.8	claystone	CL
P115489	Alluvium	Qrf	6023.40	6025.10	22.09	26.50	26.0	6003.01	5998.60	5997.4	claystone	ML
P115589	Alluvium	Qrf	6014.10	6015.77	25.05	29.48	29.0	5990.72	5986.29	5985.1	claystone	CL
P115689	Alluvium	Qrf	6006.90	6008.71	16.23	20.20	19.7	5992.48	5988.51	5987.2	claystone	SC
P119389	Alluvium	Qrf	6011.70	6013.18	12.50	16.90	16.4	6000.68	5996.28	5995.3	silty claystone	CL
B200589	Alluvium	Qrf	5968.40	5970.17	11.86	21.57	30.5	5958.31	5948.60	5937.9	claystone	
B200689	Alluvium	Qrf	5960.10	5961.94	11.58	31.01	30.5	5950.36	5930.93	5929.6	claystone	SW
B200789	Alluvium	Qrf	5946.10	5948.08	9.07	28.50	28.0	5939.01	5919.58	5918.1	claystone	
B200889	Alluvium	Qrf	5936.10	5938.08	8.60	23.12	22.8	5929.48	5914.96	5913.3	silty claystone	SM
B201089	Alluvium	Qc	5883.10	5885.15	3.48	7.83	7.5	5881.67	5877.32	5875.6	sandy claystone	CL
B201189	Alluvium	Qc	5806.50	5808.41	20.36	34.80	34.0	5788.05	5773.61	5772.5	claystone	
B201289	Alluvium	Qc	5826.10	5827.80	14.73	23.90	23.4	5813.07	5803.90	5802.7	silty claystone	CL
B201489	Alluvium	Qa?	5859.40	5861.20	5.58	9.96	7.0	5855.62	5851.24	5852.4	sandy claystone	CL
B201589	Alluvium	Kcss	5846.00	5847.68	4.38	8.72	3.6	5843.30	5838.96	5842.4	claystone	CL
B201889	Alluvium	Qc	5866.80	5868.83	13.16	32.60	22.3	5855.67	5836.23	5844.5	sandy claysotne	CL
B202489	Alluvium	Qc	5770.90	5772.83	3.43	12.91	12.4	5769.40	5759.92	5758.5	silty claystone	
B202589	Alluvium	Qc	5723.60	5725.45	4.53	11.60	12.8	5720.92	5713.85	5710.8	claystone	
B203189	Bedrock	Kclst & Ksclst	5968.00	5970.12	35.26	44.70	29.8	5934.86	5925.42	5938.2	claystone	GW
B203289	Bedrock	Kclst & Ksclst	5959.70	5961.59	35.00	44.47	30.1	5926.59	5917.12	5929.6	claystone	GW
B203489	Bedrock	Kclst	5945.70	5947.71	31.00	40.50	28.6	5916.71	5907.21	5917.1	claystone	CL
B203589	Bedrock	Qrf & Ksclst & Kclst	5935.20	5937.07	29.70	39.16	31.1	5907.37	5897.91	5904.1		CL
B203689	Bedrock	Kss & Kcss & Ksltss	5920.50	5922.45	27.05	36.55	21.3	5895.40	5885.90	5899.2	claystone	SW
B203789	Bedrock	Kcslt & Kclst	5946.20	5948.28	134.15	138.59	28.7	5814.13	5809.69	5917.5	claystone	
B203889	Bedrock	Kclst	5935.80	5937.69	107.00	111.43	28.5	5830.69	5826.26	5907.3		SW
B203989	Bedrock	Ksltss & Kslt	5920.90	5922.78	125.97	130.42	22.7	5796.81	5792.36	5898.2	clayey sandstone	GC
B204089	Bedrock	Ksltss	5877.60	5879.29	106.50	112.90	1.2	5772.79	5766.39	5876.4	claystone	CL
B204189	Bedrock	Kcss, Ksltss & Ksclst	5826.90	5828.86	81.10	95.33	3.5	5747.76	5733.53	5823.4	claystone	
B204689	Bedrock	Ksltss & Ksltclst	5901.40	5902.82	105.50	109.50	1.3	5797.32	5793.32	5900.1	claystone	CL
B205589	Alluvium	Qc	5806.40	5808.46	6.87	16.30	32.3	5801.59	5792.16	5774.1		CL
B206189	Bedrock	Qrf	5984.50	5986.57	25.90	35.36	20.9	5960.67	5951.21	5963.6	claystone	CL
B206289	Bedrock	Ksltclst & Kclst	5977.59	5979.49	32.37	41.82	15.0	5947.12	5937.67	5962.59	claystone	SC
B206389	Alluvium	Qrf	5969.70	5971.56	4.00	9.50	13.3	5967.56	5962.06	5956.4	claystone	GC
B206489	Alluvium/Bedrock	Qrf & Ksltclst	5969.14	5971.46	3.25	10.00	7.3	5968.21	5961.46	5961.84	silty claystone	GC

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
B206589	Bedrock	Kclst	5967.80	5969.72	23.50	35.10	7.5	5946.22	5934.62	5960.3	claystone	GW
B206689	Bedrock	Ksltclst	5959.31	5961.20	8.70	18.17	3.7	5952.50	5943.03	5955.61	silty claystone	GC
B206789	Bedrock	Kclst	5927.90	5930.19	9.80	19.28	4.8	5920.39	5910.91	5923.1	claystone	CL
B206889	Bedrock	Ksltclst	5917.09	5919.15	8.00	17.45	3.0	5911.15	5901.70	5914.09	silty claystone	CL
B206989	Bedrock	Ksclst	5882.42	5884.32	11.80	21.30	6.0	5872.52	5863.02	5876.42	sandy claystone	CL
B207089	Bedrock	Ksclst & Ksltclst	5883.07	5884.95	31.32	52.98	6.0	5853.63	5831.97	5877.07	silty sandstone	ML
B207189	Bedrock	Ksltclst & Kclst	5884.80	5886.72	70.98	75.43	5.5	5815.74	5811.29	5879.3	claystone	GC
B207289	Bedrock	Ksltclst	5948.27	5950.49	5.20	14.65	0.2	5945.29	5935.84	5948.07	silty claystone	ML
P207389	Bedrock	Kss & Kclst	5981.02	5982.77	10.53	15.18	7.0	5972.24	5967.59	5974.02	claystone	SC
P207489	Alluvium	Qrf	5980.71	5982.64	2.39	7.00	6.5	5980.25	5975.64	5974.21	claystone	SM
P207589	Bedrock	Ksltclst	5974.06	5975.96	14.40	23.86	9.4	5961.56	5952.10	5964.66	silty claystone	CL
P207689	Alluvium	Qrf	5966.32	5967.88	3.64	13.10	12.6	5964.24	5954.78	5953.72	silty claystone	SC
P207789	Bedrock	Ksltclst	5965.88	5967.75	17.90	27.34	12.9	5949.85	5940.41	5952.98	silty claystone	CL
P207889	Alluvium	Qrf	5962.82	5964.90	3.26	7.70	8.5	5961.64	5957.20	5954.32	claystone	
P207989	Bedrock	Kclst	5963.09	5965.17	11.00	20.48	5.8	5954.17	5944.69	5957.29	claystone	GP
B208089	Alluvium	Qc	5935.40	5937.07	3.40	13.90	12.2	5933.67	5923.17	5923.2	claystone	
B208189	Bedrock	Kclst	5935.40	5937.46	16.90	26.34	11.0	5920.56	5911.12	5924.4	silty claystone	CL
B208289	Bedrock	Ksltclst & Kclst	5850.70	5852.95	5.95	15.42	0.8	5847.00	5837.53	5849.9	claystone	
B208389	Bedrock	Ksclst & Kclst	5876.80	5878.66	3.37	7.80	0.2	5875.29	5870.86	5876.6	claystone	CL
B208489	Bedrock	Kclst	5876.30	5878.34	19.76	29.22	15.5	5858.58	5849.12	5860.8		CL
B208589	Alluvium	Qc	5856.50	5858.35	3.23	3.99	3.6	5855.12	5854.36	5852.9	claystone	
B208689	Bedrock	Ksltclst	5867.60	5869.60	12.32	21.82	7.3	5857.28	5847.78	5860.3	silty claystone	GM
B208789	Alluvium	Qc	5907.10	5909.03	2.88	10.93	8.4	5906.15	5898.10	5898.7	claystone	
P208889	Bedrock	Ksltclst	5947.30	5949.25	87.76	96.94	5.5	5861.49	5852.31	5941.8	siltstone	CL
P208989	Bedrock	Ksltss & Ksltclst	5962.53	5964.56	15.40	24.84	3.5	5949.16	5939.72	5959.03		
P209089	Bedrock	Ksltclst	5972.16	5974.25	16.50	25.96	11.5	5957.75	5948.29	5960.66	silty claystone	GC
P209189	Bedrock	Kss & Ksltclst	5980.66	5982.21	13.30	35.01	10.3	5968.91	5947.20	5970.36	sandstone	SW
P209289	Alluvium	Qrf	5981.59	5983.42	8.20	12.66	12.2	5975.22	5970.76	5969.39	sandy claystone	GC
P209389	Bedrock	Kss & Ksltss & Kcss	5981.47	5983.39	16.82	28.80	13.8	5966.57	5954.59	5967.67	clayey sandstone	
P209489	Bedrock	Kss & Ksltss	5977.98	5980.10	15.48	35.00	9.0	5964.62	5945.10	5968.98	claystone	CL
P209589	Bedrock	Ksltclst & Ksclst	5948.17	5950.04	9.07	18.52	4.1	5940.97	5931.52	5944.07	silty claystone	GC
P209689	Bedrock	Ksltclst	5962.63	5964.43	17.20	26.67	12.2	5947.23	5937.76	5950.43	sandy claystone	CL
P209789	Alluvium	Qrf	5962.82	5964.94	3.00	12.50	12.0	5961.94	5952.44	5950.82	silty claystone	CL
P209889	Bedrock	Ksltclst	5940.28	5942.40	8.89	18.33	3.9	5933.51	5924.07	5936.38	silty claystone	CL
P209989	Alluvium	Qc	5898.10	5900.40	3.81	8.18	7.7	5896.59	5892.22	5890.4	silty claystone	CL
P210089	Bedrock	Ksltclst	5898.40	5900.40	12.20	21.50	7.2	5888.20	5878.90	5891.2	silty claystone	CL
P210189	Bedrock	Ksltss & Ksclst	5980.82	5982.43	20.40	36.14	14.6	5962.08	5946.34	5966.22	clayey siltstone	SM
P210289	Bedrock	Ksltclst	5967.03	5969.19	11.57	21.00	6.6	5957.62	5948.19	5960.43	silty claystone	GC
B210389	Bedrock	Ksltclst	5873.20	5875.32	13.61	23.07	8.6	5861.71	5852.25	5864.6	silty claystone	GC
B210489	Alluvium	Qc	5856.40	5858.71	2.98	7.41	7.0	5855.73	5851.30	5849.4	claystone	GC
P213689	Alluvium	Qrf	5994.30	5996.04	9.08	13.50	13.0	5986.96	5982.54	5981.3	claystone	
B213789	Alluvium	Qc	5917.80	5920.01	2.46	6.90	6.4	5917.55	5913.11	5911.4	clayey sandstone	CL
P213889	Bedrock	Kss & Kcss	5954.10	5955.94	11.30	20.80	8.0	5944.64	5935.14	5946.1	sandstone	

282

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
P213989	Alluvium	Qrf	5954.30	5956.38	3.29	6.92	6.7	5953.09	5949.46	5947.6	claystone	ML
P215789	Alluvium	Qrf	6002.00	6003.66	14.53	18.50	18.0	5989.13	5985.16	5984	claystone	GP
B217289	Bedrock	Kss, Ksltss, Kcslt	5677.60	5679.10	109.81	134.10	5.1	5569.29	5545.00	5672.5	claystone	CL
B217489	Bedrock	Kss	5961.20	5963.23	142.03	146.43	25.0	5821.20	5816.80	5936.2	silty claystone	SC
B217589	Bedrock	Kss & Ksltclst	5952.90	5954.89	85.23	90.74	17.3	5869.66	5864.15	5935.6	clayey siltstone	GW
B217689	Bedrock	Kclss	5960.53	5961.82	98.52	102.91	22.0	5863.30	5858.91	5938.53	clayey sandstone	GC
B217789	Bedrock	Ksltclst	5954.90	5956.85	72.00	83.84	23.6	5884.85	5873.01	5931.3	silty claystone	SC
P218089	Alluvium	Qrf	5985.80	5987.55	3.00	7.30	6.0	5984.55	5980.25	5979.8	claystone	
P218289	Alluvium	Qrf	6016.90	6018.20	9.60	23.50	23.0	6008.60	5994.70	5993.9		
P218389	Alluvium	Qrf	5956.20	5958.45	8.06	12.50	12.0	5950.39	5945.95	5944.2	claystone	ML
B218789	Alluvium	Qrf	5962.80	5964.52	9.06	28.50	28.0	5955.46	5936.02	5934.8	silty claystone	SC
P219089	Alluvium	Qc, Kclst & Ksltclst	5949.10	5949.90	5.00	14.44	10.4	5944.90	5935.46	5938.7	silty claystone	CL
P219189	Alluvium	Qc	5941.20	5943.15	7.08	11.50	11.0	5936.07	5931.65	5930.2	claystone	CL
P219489	Alluvium	Qrf	5959.50	5961.15	18.48	22.90	22.5	5942.67	5938.25	5937	claystone	GC
P219589	Bedrock	Kclst & Ksclst	5963.80	5965.70	21.27	25.70	17.2	5944.43	5940.00	5946.6	clayey sandstone	GC
P219989	Alluvium	borehole not logged	5967.83	5968.63	20.02	24.45		5948.61	5944.18	5967.83		
B220189	Alluvium	Qrf	5949.27	5951.27	12.91	14.86	15.0	5938.36	5936.41	5934.27		CL
B220489	Alluvium	borehole not logged	5958.19	5960.19	25.35	27.30		5934.84	5932.89	5958.19		
B301889								0.00		0		
B302089	Alluvium	Qc	5907.60	5909.55	3.85	13.30	13.5	5905.70	5896.25	5894.1	claystone	
B302789	Alluvium	Qc	5832.30	5834.17	4.00	8.55	8.0	5830.17	5825.62	5824.3	silty claystone	SM
B302889	Alluvium	Qc	5730.80	5733.16	5.92	11.90	12.2	5727.24	5721.26	5718.6	claystone	
B302989	Alluvium	Qa	5686.20	5688.15	3.46	7.90	7.4	5684.69	5680.25	5678.8	silty claystone	SM
B303089	Bedrock	Kclst	5601.20	5602.93	4.61	7.00	4.6	5598.32	5595.93	5596.6	claystone	CL
B304289	Bedrock	Kss & Kslt & Kclst	5833.00	5838.18	84.04	88.49	10.5	5754.14	5749.69	5822.5	silty claystone	SW
B304589	Bedrock	Qc	5832.30	5834.25	5.00	9.42	10.8	5829.25	5824.83	5821.5	slity claystone	SM
B304789	Bedrock	Kclst	5867.80	5869.56	27.90	37.50	22.9	5841.66	5832.06	5844.9	sandy claystone	GC
B304889	Bedrock	Kclst	5730.60	5732.56	14.66	24.14	9.2	5717.90	5708.42	5721.4	claystone	CL
B304989	Bedrock	Ksltss & Ksslt	5729.70	5731.85	75.50	82.90	8.4	5656.35	5648.95	5721.3	claystone	CL
P313489	Alluvium	Qrf	6011.70	6013.58	16.71	21.00	20.6	5996.87	5992.58	5991.1	claystone	SW
P313589	Alluvium	Qrf	6008.50	6010.11	8.08	12.50	11.0	6002.03	5997.61	5997.5	sandy siltstone	ML
P314089	Alluvium	Qrf	5996.70	5998.49	5.37	9.79	9.3	5993.12	5988.70	5987.4	claystone	CL
P314289	Alluvium	Qrf	6010.10	6011.77	9.11	13.51	13.0	6002.66	5998.26	5997.1	claystone	CL
B315289	Bedrock	Ksltclst	5963.20	5965.21	90.03	98.00	19.0	5875.18	5867.21	5944.2		
B317189	Bedrock	Ksltss & Kclst	5725.00	5726.69	60.56	75.08	8.5	5666.13	5651.61	5716.5	claystone	
P317989	Alluvium	Qrf	5990.90	5992.84	3.00	7.49	6.4	5989.84	5985.35	5984.5	claystone	CL
B319889	Alluvium	borehole not logged	5734.63	5736.73	6.21	10.80		5730.52	5725.93	5734.63		
P320089	Alluvium	Qrf	6009.90	6011.87	14.38	18.81	18.8	5997.49	5993.06	5991.1	silty claystone	SC
B320589	Alluvium	borehole not logged	5909.50	5911.40	17.55	19.50		5893.85	5891.90	5909.5		
B400089	Alluvium	Qrf	6121.80	6123.76	28.58	37.95	48.5	6095.18	6085.81	6073.3	claystone	SC
B400189	Alluvium	Qrf	6122.20	6124.15	10.09	49.60	52.5	6114.06	6074.55	6069.7	claystone	CH
B400289	Alluvium	Qrf	6106.00	6107.71	20.52	50.00	NP	6087.19	6057.71	NP		
B400389	Alluvium	Qrf	6122.00	6124.00	9.50	49.00	48.5	6114.50	6075.00	6073.5	silty claystone	GM

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
B400489	Alluvium	Qrf	6105.01	6107.07	9.87	54.45	54.0	6097.20	6052.62	6051.01	silty claystone	GW
B401989	Alluvium	Qc	6025.60	6027.67	6.55	21.00	20.5	6021.12	6006.67	6005.1	claystone	SW
B402189	Bedrock	Kss	6024.50	6026.49	13.50	22.90	7.5	6012.99	6003.59	6017	claystone	CL
B402689	Alluvium	Qc?	6045.40	6047.07	2.55	3.28	2.8	6044.52	6043.79	6042.6	claystone	GC
B405189	Bedrock	Ksltclst	5968.10	5969.91	13.20	22.69	8.2	5956.71	5947.22	5959.9	silty claystone	SM
B405289	Bedrock	Ksclst & Ksltclst	5965.70	5967.31	41.20	45.67	8.6	5926.11	5921.64	5957.1		CL
B405389	Bedrock	Ksltclst & Kcslt	5831.90	5833.90	15.20	24.60	10.0	5818.70	5809.30	5821.9	silty claystone	SM
B405489	Bedrock	Ksltclst & Kclst	6115.90	6117.67	39.13	48.57	34.0	6078.54	6069.10	6081.9	claystone	CL
B405689	Alluvium	Qrf	6105.30	6107.25	3.00	22.51	NP	6104.25	6084.74	NP		
B405789	Alluvium	Qrf	6104.80	6106.70	43.01	52.40	52.5	6063.69	6054.30	6052.3	claystone	SW
B405889	Bedrock	Kss	6024.90	6026.87	36.04	45.50	6.5	5990.83	5981.37	6018.4	silty claystone	SM
B405989	Bedrock	Qc	6023.60	6026.06	2.80	6.70	6.1	6023.26	6019.36	6017.5	claystone	GC
B410589	Alluvium	Qrf	6111.80	6113.80	40.55	60.04	NP	6073.25	6053.76	NP		
B410689	Alluvium	Qrf	6091.70	6093.71	30.50	50.05	NP	6063.21	6043.66	NP		
B410789	Alluvium	Qrf	6082.10	6083.66	25.54	45.03	NP	6058.12	6038.63	NP		
B411289	Alluvium	Qrf	6125.40	6127.30	48.90	68.39	NP	6078.40	6058.91	NP		
B411389	Alluvium	Qrf	6109.50	6111.06	44.00	63.52	NP	6067.06	6047.54	NP		
P414189	Alluvium	Qrf	6010.60	6012.18	14.09	18.50	18.0	5998.09	5993.68	5992.6	claystone	
P415889	Alluvium	Qrf	6050.40	6052.60	38.75	43.20	49.5	6013.85	6009.40	6000.9	silty claystone	CL
P415989	Alluvium	Qrf	6044.90	6046.71	22.30	26.73	34.0	6024.41	6019.98	6010.9	silty claystone	
P416089	Alluvium	Qrf	6051.70	6053.95	29.24	34.00	33.5	6024.71	6019.95	6018.2	sandy claystone	GC
P416189	Alluvium	Qrf	6045.60	6047.95	25.23	29.66	29.2	6022.72	6018.29	6016.4	claystone	CL
P416289	Alluvium	Qrf	6038.60	6040.22	19.07	23.50	23.0	6021.15	6016.72	6015.6	silty claystone	SW
P416389	Alluvium	Qrf	6055.40	6057.14	25.69	30.10	30.0	6031.45	6027.04	6025.4	claystone	CL
P416489	Alluvium	Qrf	6048.50	6050.15	21.27	25.70	25.2	6028.88	6024.45	6023.3	sandy claystone	CL
P416589	Alluvium	Qrf	6041.20	6042.81	27.04	31.00	30.5	6015.77	6011.81	6010.7	claystone	SM
P416689	Alluvium	Qrf	6035.00	6036.55	28.09	32.50	32.0	6008.46	6004.05	6003	claystone	CL
P416789	Alluvium	Qrf	6027.80	6029.27	22.48	26.90	26.4	6006.79	6002.37	6001.4	claystone	SM
P416889	Alluvium	Qrf	6017.40	6018.79	15.86	20.27	20.2	6002.93	5998.52	5997.2	claystone	GC
P416989	Bedrock	Ksslt & Kslt	6045.20	6047.55	151.16	155.70	30.0	5896.39	5891.85	6015.2	claystone	GM
P419689	Alluvium	Qrf & Kss	6022.40	6023.42	19.08	23.50	22.0	6004.34	5999.92	6000.4	sandstone	CL
0190	Alluvium	Qrf	6044.30	6045.88	29.50	44.50	62.5	6016.38	6001.38	5981.8		
0290	Alluvium	Qrf	6048.30	6050.65	42.50	57.50	63.5	6008.15	5993.15	5984.8		
0390	Alluvium	Qrf	6075.40	6079.13	50.00	65.50	92.0	6029.13	6013.63	5983.4		
0490	Alluvium	Qrf	6048.50	6050.92	40.00	55.00	69.5	6010.92	5995.92	5979		
0590	Alluvium	Qrf	6096.80	6099.77	11.00	26.00	50.0	6088.77	6073.77	6046.8		
0690	Alluvium	Qrf	6083.70	6086.91	7.00	22.00	41.3	6079.91	6064.91	6042.4		
0790	Alluvium	Qrf	6095.90	6098.79	33.00	48.00	48.8	6065.79	6050.79	6047.1		
0990	Alluvium	Qrf	6080.50	6083.48	20.00	35.00	35.0	6063.48	6048.48	6045.5		
1090	Alluvium	Qrf	5984.10	5986.86	15.00	30.00	33.8	5971.86	5956.86	5950.3		
1190	Alluvium	Qrf	5998.00	6001.08	14.30	29.30	40.0	5986.78	5971.78	5958		
1290	Alluvium	Qrf	6012.40	6014.87	20.00	35.00	44.0	5994.87	5979.87	5968.4		
1390	Alluvium	Qrf	6017.50	6020.62	24.00	39.00	47.5	5996.62	5981.62	5970		

284

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
1490	Alluvium	Qrf	6068.90	6071.28	44.50	59.50	66.0	6026.78	6011.78	6002.9		
3390	Alluvium	Qc & Kclst	5916.40	5918.41	6.05	8.00	8.0	5912.36	5910.41	5908.4	silty claystone	CL
3490	Alluvium	Qc	5913.60	5915.55	5.55	7.50	7.5	5910.00	5908.05	5906.1	silty claystone	CL
3590	Alluvium	Qc	5911.90	5913.89	7.70	9.70	9.7	5906.19	5904.19	5902.2	silty claystone	CL
3690	Alluvium	Qc	5912.20	5914.19	12.06	16.50	17.2	5902.13	5897.69	5895	silty claystone	
00191	Alluvium	Qrf	5968.86	5970.44	15.00	25.00	24.2	5955.44	5945.44	5944.66	claystone	GC/GP
00291	Bedrock	Kclss & Ksclst	5966.17	5967.57	44.00	54.00	16.0	5923.57	5913.57	5950.17	sandy claystone	
00391	Bedrock	Ksclst & Kcss	5920.84	5922.40	16.80	21.80	16.9	5905.60	5900.60	5903.94	sandy claystone	SM
00491	Alluvium/Bedrock	Kclst	5903.47	5904.97	7.50	17.50	10.9	5897.47	5887.47	5892.57	claystone	
00691	Alluvium	Qc	5894.47	5896.13	5.30	12.30	NP	5890.83	5883.83	NP		
00791	Alluvium	Qc	5907.11	5908.27	8.50	18.50	17.6	5899.77	5889.77	5889.51	claystone	ML/GM
00891	Alluvium	Qc	5868.35	5869.95	7.90	17.90	18.2	5862.05	5852.05	5850.15	claystone	CL
00991	Bedrock	Ksclst	5867.00	5868.56	5.00	10.50	2.9	5863.56	5858.06	5864.1	sandy claystone	
01291	Alluvium	Qc	5851.21	5852.85	5.30	13.30	12.9	5847.55	5839.55	5838.31	silty claystone	CL
01391	Alluvium	Qrf	5973.70	5975.30	6.00	14.00	14.5	5969.30	5961.30	5959.2	sandy claystone	CL
01491	Bedrock	Kss & Kcs	5970.37	5972.03	14.00	24.00	1.6	5958.03	5948.03	5968.77	sandy claystone	SC
01791	Bedrock	Ksltss & Ksclst	5965.78	5967.41	10.00	18.00	8.0	5957.41	5949.41	5957.78	silty sandstone	
01891	Bedrock	Ksltss & Ksltclst	5971.76	5973.37	20.00	30.00	12.4	5953.37	5943.37	5959.36	silty sandstone	GW
01991	Bedrock	Ksclst & Ksltclst	5962.19	5963.61	28.80	38.80	29.4	5934.81	5924.81	5932.79	sandy claystone	GC
02091	Bedrock	Ksclst, Ksslt, Ksltclst	5965.19	5966.65	15.60	30.60	16.1	5951.05	5936.05	5949.09	sandy claystone	GW
02191	Alluvium	Qrf	5965.81	5967.51	8.00	13.00	13.5	5959.51	5954.51	5952.31	claystone	CL
02291	Bedrock	Ksclst & Kclss	5936.66	5938.26	11.50	16.50	8.8	5926.76	5921.76	5927.86	claystone	CL
02391	Alluvium	Qrf	5956.82	5958.43	3.00	6.00	6.9	5955.43	5952.43	5949.92	silty claystone	
02491	Bedrock	Ksltss, Ksslt	5944.54	5946.21	11.80	16.80	8.5	5934.41	5929.41	5936.04	claystone	CL
02591	Bedrock	Kclss & Ksclst	5923.57	5925.34	42.10	49.10	39.8	5883.24	5876.24	5883.77	clayey sandstone	GM
02691	Bedrock	Ksltss & Ksltclst	5934.78	5936.38	6.00	15.00	1.1	5930.38	5921.38	5933.68	sandstone	GW
02791	Alluvium	Qrf	5954.34	5955.79	6.50	9.50	8	5949.29	5946.29	5946.34		
02891	Alluvium	Qrf	5953.09	5954.61	6.00	9.00	9.1	5948.61	5945.61	5943.99	silty claystone	GW
02991	Bedrock	Kclss & Ksclst	5956.30	5957.90	42.00	52.00	15.8	5915.90	5905.90	5940.5		
03091	Bedrock	Ksltss, Kss & Ksclst	5952.88	5954.23	35.00	50.00	17.3	5919.23	5904.23	5935.58	sandy siltstone	SW
03191	Alluvium	Qrf	5950.35	5952.02	11.20	21.20	21.1	5940.82	5930.82	5929.25		
03391	Bedrock	Kss, Ksltss & Ksclst	5944.54	5946.22	29.90	39.90	10.8	5916.32	5906.32	5933.74	?	SC
03591	Alluvium	Qrf	5949.02	5950.80	20.10	30.10	30.1	5930.70	5920.70	5918.92	claystone	GW
03691	Bedrock	Kss & Kcss	5932.55	5934.43	30.00	40.00	7.5	5904.43	5894.43	5925.05	sandy claystone	CL
03791	Bedrock	Kss, Ksclst & Ksltss	5936.80	5938.24	38.00	48.00	4.9	5900.24	5890.24	5931.9	claystone	CL
03891	Alluvium	Qrf	5940.89	5942.95	4.00	7.00	7.4	5938.95	5935.95	5933.49	claystone	GW
03991	Alluvium	Qrf	5935.17	5936.87	27.40	37.40	36.0	5909.47	5899.47	5899.17	?	
04091	Alluvium	Qrf	5928.52	5930.14	28.10	36.00	36.0	5902.04	5894.14	5892.52	sandy claystone	
04191	Alluvium	Qrf	5955.58	5956.99	7.10	17.10	17.1	5949.89	5939.89	5938.48	sandy claystone	CL
04291	Bedrock	Ksclst	5952.50	5953.90	18.10	23.10	17.0	5935.80	5930.80	5935.5	sandy claystone	CL
04491	Alluvium	Qrf	5949.51	5951.15	17.00	27.00	27.0	5934.15	5924.15	5922.51	sandy claystone	CL
04591	Alluvium	Qrf	5948.69	5950.25	34.10	44.10	44.2	5916.15	5906.15	5904.49		GW
04691	Alluvium	Qrf	5944.70	5946.43	33.90	43.90	43.9	5912.53	5902.53	5900.8		GW

Appendix C
Top of Bedrock and Well Component Elevations

Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
04891	Alluvium	Qrf	5939.20	5940.76	29.70	39.70	39.7	5911.06	5901.06	5899.5		
04991	Alluvium	Qrf	5936.94	5938.63	30.30	40.30	40.2	5908.33	5898.33	5896.74	sandy claystone	GW
05091	Alluvium	Qrf	5937.63	5939.24	34.00	44.00	43.5	5905.24	5895.24	5894.13	claystone	GW
05191	Alluvium	Qrf	5938.40	5939.85	36.00	46.00	44.8	5903.85	5893.85	5893.6	silty claystone	GW
05291	Alluvium	Qrf	5941.23	5943.00	25.10	35.10	34.4	5917.90	5907.90	5906.83	sandy claystone	GW
05391	Alluvium	Qrf	5940.19	5941.67	22.00	35.10	34.9	5919.67	5906.57	5905.29	silty claystone	GW
05691	Alluvium	Qrf	5947.61	5948.99	25.10	35.10	35.2	5923.89	5913.89	5912.41	sandy claystone	SC
05991	Alluvium	Qc	5908.32	5909.91	12.10	22.10	22.1	5897.81	5887.81	5886.22	claystone	GC
06091	Alluvium/Bedrock	Qrf	5930.08	5931.60	30.70	40.70	39.1	5900.90	5890.90	5890.98	silty claystone	GW
06191	Alluvium	Qrf	5919.21	5920.72	22.10	32.10	32.0	5898.62	5888.62	5887.21		
06291	Bedrock	Kclst	5897.90	5899.28	27.90	32.90	23.3	5871.38	5866.38	5874.6	silty claystone	GW
06391	Alluvium	Qrf	5903.63	5905.17	17.60	22.60	21.2	5887.57	5882.57	5882.43	sandy claystone	GW
06491	Bedrock	Ksltss & Ksclst	5671.45	5673.25	10.90	15.90	2.2	5662.35	5657.35	5669.25	sandy claystone	SC
06591	Bedrock	Ksclst & Ksltclst	5978.28	5979.78	33.00	48.00	15.4	5946.78	5931.78	5962.88	sandy claystone	CL
06691	Alluvium	Qrf	5978.34	5979.94	13.10	23.10	22.0	5966.84	5956.84	5956.34	silty claystone	
06791	Alluvium	Qrf	5978.87	5980.38	11.20	21.20	21.2	5969.18	5959.18	5957.67	claystone	SM
06891	Alluvium	Qrf	5974.14	5975.62	6.00	14.00	14.0	5969.62	5961.62	5960.14	silty claystone	
06991	Alluvium	Qrf	5972.91	5974.57	14.00	29.00	28.6	5960.57	5945.57	5944.31	claystone	CL
07191	Alluvium	Qrf	5974.79	5976.34	11.20	21.20	20.0	5965.14	5955.14	5954.79	claystone	
07291	Alluvium	Qrf	5977.27	5978.30	10.60	20.60	20.0	5968.20	5958.20	5957.27	claystone	
07391	Alluvium/Bedrock	Qrf & Kclst	5949.14	5950.61	5.40	11.40	8.1	5945.21	5939.21	5941.04	claystone	GM
07891	Alluvium	Qrf	5957.78	5959.45	18.00	28.00	27.5	5941.45	5931.45	5930.28		
07991	Alluvium	Qrf	5954.91	5956.78	16.10	26.10	26.0	5940.68	5930.68	5928.91	claystone	
08091	Alluvium	Qrf	5947.90	5949.51	11.30	16.30	16.1	5938.21	5933.21	5931.8	claystone	SC/CL
08291	Alluvium	Qrf	5950.18	5951.94	6.00	14.00	14.0	5945.94	5937.94	5936.18	sandy claystone	
08391	Alluvium	Qrf	5947.20	5948.65	28.00	38.00	37.2	5920.65	5910.65	5910	sandy claystone	GC
08491	Alluvium	Qrf	5950.58	5952.16	6.00	16.00	16.0	5946.16	5936.16	5934.58	sandy claystone	
08591	Alluvium	Qrf	5948.57	5950.12	32.00	42.00	40.7	5918.12	5908.12	5907.87	sandy claystone	GW
08891	Alluvium	Qrf	5976.36	5978.06	15.30	25.30	23.0	5962.76	5952.76	5953.36		
09091	Alluvium	Qrf	5975.16	5976.79	14.70	24.70	24.0	5962.09	5952.09	5951.16	claystone	
09691	Bedrock	Ksltss & Kclst	5935.64	5937.05	6.00	14.00	3.1	5931.05	5923.05	5932.54	claystone	CL
10991	Bedrock	Ksltss	5940.01	5941.64	46.00	51.00	45.2	5895.64	5890.64	5894.81	silty sandstone	GW
11291	Alluvium	Qrf	5930.55	5932.12	21.00	31.00	NP	5911.12	5901.12	NP		
11491	Alluvium	Qrf	5948.22	5949.76	10.30	25.30	NP	5939.46	5924.46	NP		
11691	Bedrock	Kclss & Kss	5938.63	5939.91	18.50	33.50	9.5	5921.41	5906.41	5929.13	claystone	GW
11791	Bedrock	Ksclst	5923.29	5925.03	8.70	13.70	6.9	5916.33	5911.33	5916.39	sandy claystone	CL
11891	Bedrock	Ksslt & Ksltss	5945.51	5947.44	13.00	28.00	12.0	5934.44	5919.44	5933.51	silty sandstone	GW
12091	Bedrock	Ksltss	5971.59	5973.27	14.00	22.00	13.2	5959.27	5951.27	5958.39	silty sandstone	GW
12191	Bedrock	Ksltss & Kss	5956.49	5958.19	18.00	33.00	15.7	5940.19	5925.19	5940.79	silty sandstone	GW
12291	Bedrock	Kclss & Kss	5970.98	5972.73	7.10	14.10	2.0	5965.63	5958.63	5968.98	sandy claystone	SC
12391	Bedrock	Kss, Ksltss & Kclss	5940.07	5941.70	58.40	68.40	36.5	5883.30	5873.30	5903.57		
12491	Bedrock	Kss & Kclss	5946.84	5948.35	45.00	60.00	30.0	5903.35	5888.35	5916.84	clayey sandstone	
12691	Bedrock	Kss	5949.68	5951.08	48.10	63.10	20.0	5902.98	5887.98	5929.68	claystone	

286

Appendix C
Top of Bedrock and Well Component Elevations

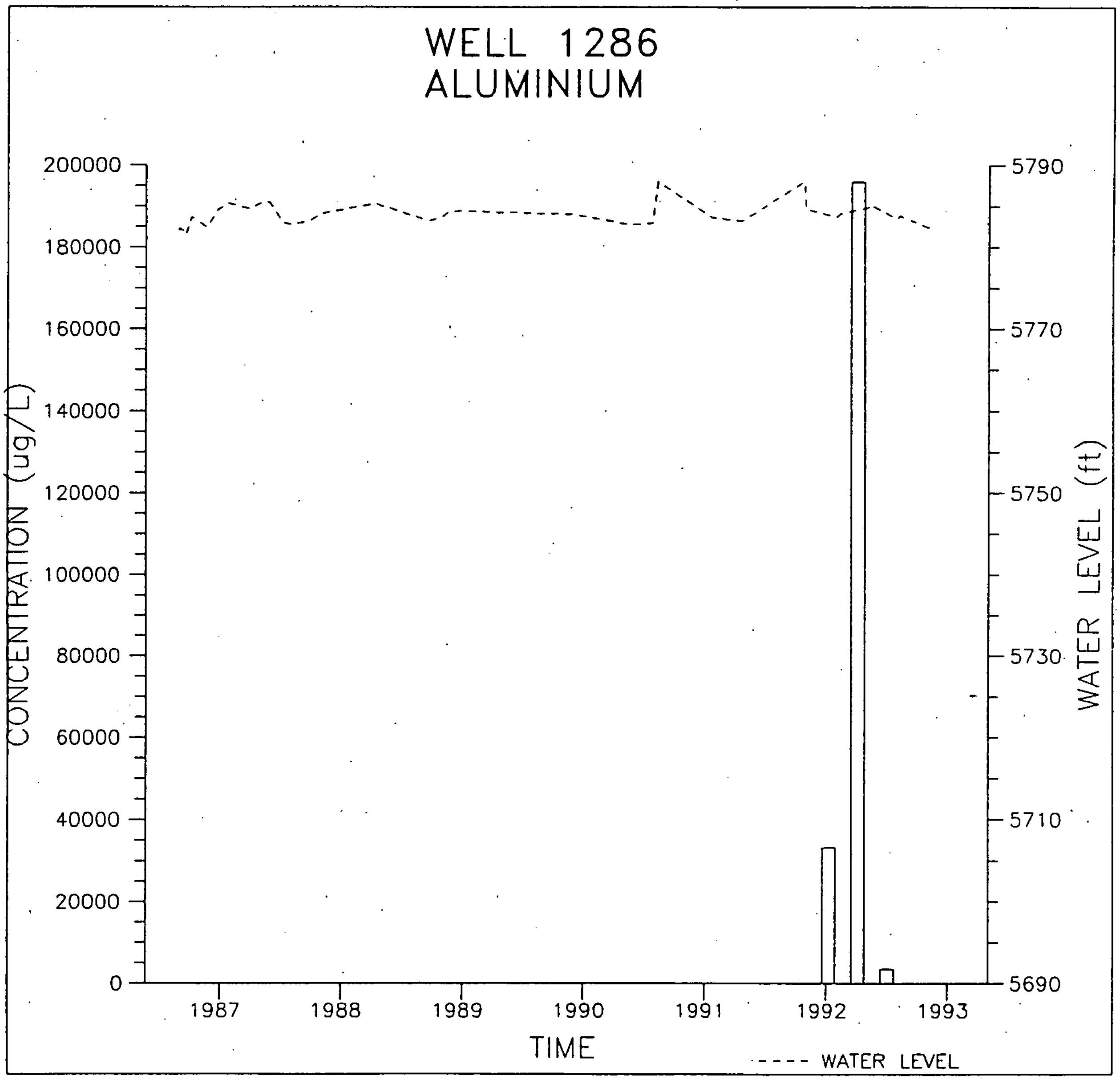
Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
12891	Alluvium	Qrf	5946.76	5948.35	25.50	35.50	37.0	5922.85	5912.85	5909.76	silty claystone	GC
12991	Bedrock	Ksclst	5965.71	5967.22	19.50	34.50	16.1	5947.72	5932.72	5949.61		GC
13091	Alluvium	Qrf	5973.68	5975.20	11.30	21.30	19.5	5963.90	5953.90	5954.18		
13191	Bedrock	Ksclst	5978.25	5979.90	15.70	25.70	15.4	5964.20	5954.20	5962.85	sandy claystone	CL
13291	Alluvium	Qrf	5978.48	5979.97	5.20	15.70	15.4	5974.77	5964.27	5963.08	sandy claystone	CL
13391	Alluvium	Qrf	5923.83	5925.35	29.00	39.00	38.6	5896.35	5886.35	5885.23	silty claystone	GC
13491	Alluvium	Qrf	5961.92	5963.42	19.00	29.00	29.4	5944.42	5934.42	5932.52	sandy claystone	GC
13591	Alluvium	Qrf	5965.92	5967.55	6.00	16.00	16.0	5961.55	5951.55	5949.92	sandy claystone	GM
20091	Alluvium/Bedrock	Qrf, Kclst & Kclss	5947.03	5948.52	17.00	57.00	31.7	5931.52	5891.52	5915.33	claystone	GC
20191	Bedrock	Ksclst & Kclss	5946.93	5948.49	37.00	57.00	33.1	5911.49	5891.49	5913.83	claystone	GC
20291	Alluvium	Qrf	5947.19	5948.58	18.00	33.00	33.1	5930.58	5915.58	5914.09	claystone	SC/GC
20491	Alluvium	Qrf	5947.23	5948.71	16.60	31.60	NP	5932.11	5917.11	#VALUE!		
20591	Alluvium	Qrf	5968.01	5969.61	4.10	24.10	24.5	5965.51	5945.51	5943.51	sandy claystone	GC
20691	Alluvium	Qrf	5968.09	5969.63	4.50	24.50	24.5	5965.13	5945.13	5943.59	sandy claystone	GC
20791	Bedrock	Kclst & Ksclst	5967.90	5969.49	29.50	34.50	24.5	5939.99	5934.99	5943.4	sandy claystone	GC
20991	Bedrock	Kclss, Kclst, Kss, Ksclst	5949.78	5951.39	21.00	63.00	19.4	5930.39	5888.39	5930.38	clayey sandstone	CL
21091	Alluvium	Ksltss, Kclss	5948.57	5950.12	19.00	63.00	15.0	5931.12	5887.12	5933.57	sandy claystone	CL
21191	Bedrock	Kclss	5946.85	5948.52	35.80	57.80	31.7	5912.72	5890.72	5915.15	claystone	GC
30991	Alluvium	Qc	5849.77	5851.82	5.10	9.90	8.8	5846.72	5841.92	5840.97	claystone	GC
31491	Alluvium/Bedrock	Qa & Ksltss	5902.58	5905.03	13.90	18.90	16.5	5891.13	5886.13	5886.08	silty sandstone	CL
31791	Alluvium/Bedrock	Qc & Kclst	5877.06	5879.80	6.80	11.80	8.8	5873.00	5868.00	5868.26	claystone	CL
31891	Alluvium/Bedrock	Qc & Kclss	5916.91	5919.52	16.59	18.59	17.2	5902.93	5900.93	5899.71	clayey sandstone	CL
32591	Bedrock	Qc	5914.86	5917.41	11.50	16.50	15.9	5905.91	5900.91	5898.96	claystone	
33491	Alluvium	Qc & Kclst	5926.06	5928.59	6.68	8.69	8.0	5921.91	5919.90	5918.06	claystone	ML/CL
33691	Alluvium	Qc	5926.99	5929.24	6.19	8.20	7.8	5923.05	5921.04	5919.19	claystone	SM
33891	Alluvium	Qc & Kclst	5927.54	5929.94	6.70	8.70	8.1	5923.24	5921.24	5919.44	claystone	CL
34591	Alluvium	Qc & Kclst	5952.19	5954.63	6.90	8.90	8.2	5947.73	5945.73	5943.99	claystone	SM
34791	Alluvium	Qc	5951.39	5953.91	6.00	8.00	8.0	5947.91	5945.91	5943.39	claystone	
35391	Bedrock	Kclst	5960.73	5963.03	6.10	8.11	6	5956.93	5954.92	5954.73	claystone	
35691	Alluvium	Qc	5938.76	5941.36	15.60	26.56	25.2	5925.76	5914.80	5913.56	silty claystone	CL
35991	Alluvium	Qc	5973.25	5976.45	8.68	13.70	12.2	5967.77	5962.75	5961.05	claystone	ML
36191	Alluvium	Qc	5962.89	5965.17	9.52	14.60	14	5955.65	5950.57	5948.89	claystone	
36391	Alluvium	Qrf	5964.57	5967.01	17.43	27.41	26.4	5949.58	5939.60	5938.17	claystone	GC
36691	Alluvium	Qc	5949.76	5951.52	15.83	25.83	25.0	5935.69	5925.69	5924.76	claystone	CH
36991	Alluvium	Qrf & Kclst	5969.48	5972.31	6.62	8.62	8.0	5965.69	5963.69	5961.48	claystone	CH
37191	Alluvium	Qc	5945.91	5948.29	11.12	21.07	20.5	5937.17	5927.22	5925.41	claystone	SM
37591	Alluvium	Qrf	5991.42	5993.45	7.60	12.60	12	5985.85	5980.85	5979.42	claystone	
37691	Alluvium	Qrf	5984.46	5985.24	6.50	16.50	16.2	5978.74	5968.74	5968.26	claystone	SC
37791	Alluvium	Qrf	6002.16	6004.18	10.60	20.60	20	5993.58	5983.58	5982.16	claystone	
37891	Bedrock	Kcsltst & Ksltst	5925.22	5926.29	43.20	53.20	4.7	5883.09	5873.09	5920.52	claystone	SC
37991	Bedrock	Kcsltst & Kssltst	5931.45	5933.55	45.20	55.20	6.9	5888.35	5878.35	5924.55	claystone	CL
38191	Alluvium	Qc	5924.47	5926.40	10.10	14.10	14.7	5916.30	5912.30	5909.77	claystone	SM
38291	Alluvium	Qc	5924.49	5926.71	6.70	8.70	8.4	5920.01	5918.01	5916.09	claystone	SM

287

Appendix C
Top of Bedrock and Well Component Elevations

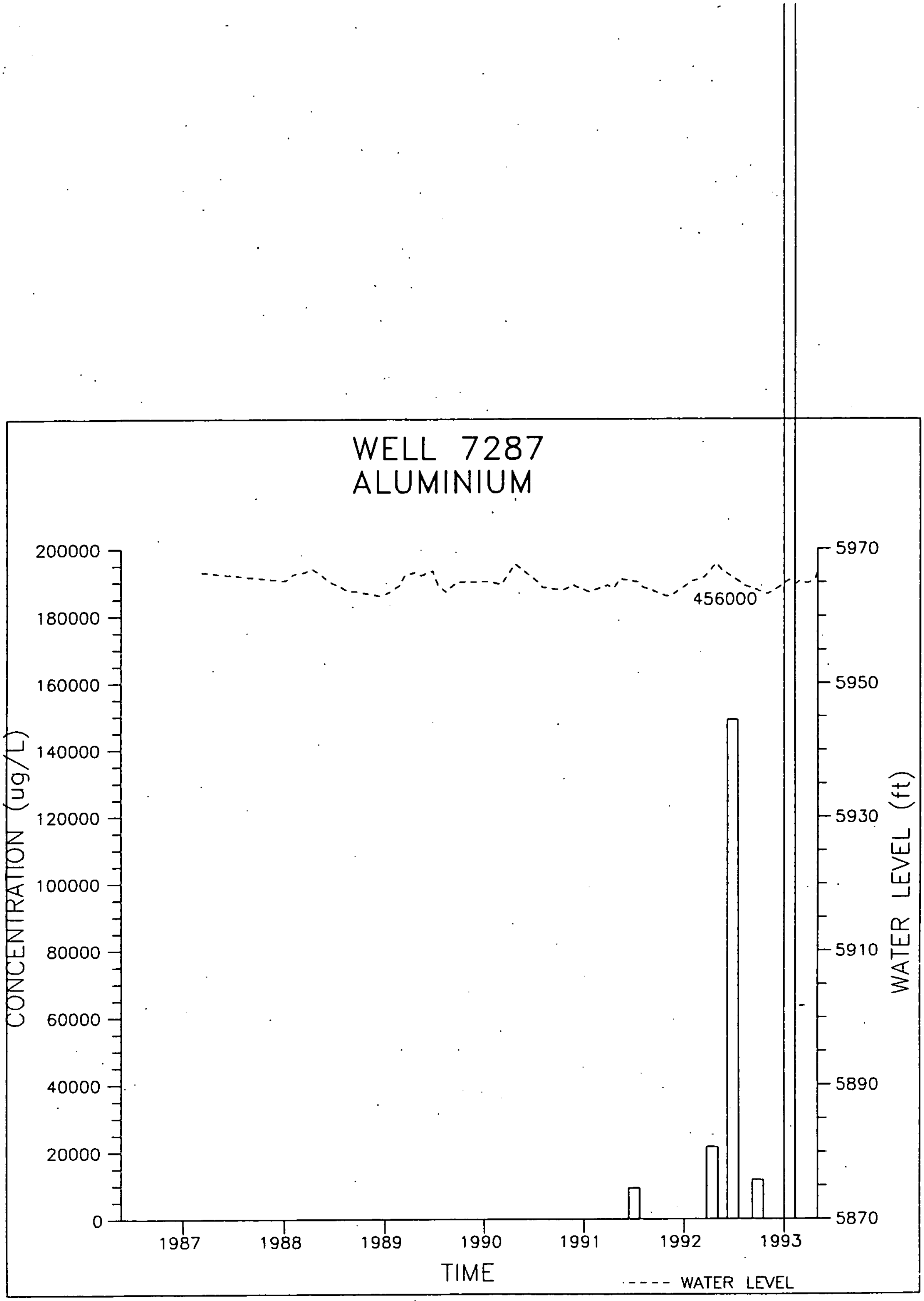
Well Name	Well Screened in:	Completion Unit/Lith	Surface Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Bottom of Screen	Depth to Top of Bedrock	Top of Screen Elevation	Bottom of Screen Elevation	Top of Bedrock Elevation	Top of Bedrock Lithology	Base of Alluvium Lithology
38591	Alluvium	Qc	5864.72	5866.62	5.66	7.70	7.3	5860.96	5858.92	5857.42	claystone	SM
38891	Alluvium	Qc	5891.26	5893.24	7.30	9.30	9.0	5885.94	5883.94	5882.26	claystone	CL
38991	Bedrock	Kclst, Ksltst, Kcsltst	5893.08	5895.45	26.80	38.00	19.5	5868.65	5857.45	5873.58	claystone	CL
39191	Bedrock	Ksltst, Kclsltst, Kclst	5918.16	5918.32	32.80	42.80	7.1	5885.52	5875.52	5911.06	claystone	CL
39291	Bedrock	Ksltclst, Kcsltst	5908.38	5910.24	33.90	43.95	10.8	5876.34	5866.29	5897.58	silty claystone	CL
39691	Bedrock	Qrf & Kclst	6006.26	6008.37	7.00	9.00	8.0	6001.37	5999.37	5998.26	clayey sandstone	ML
39991	Alluvium	Qc	5929.90	5932.36	13.30	18.20		5919.06	5914.16	5929.9		
40491	Alluvium	Qa	5677.33	5678.66	8.30	10.00	10.2	5670.36	5668.66	5667.13		
40791	Alluvium	Qc	5688.46	5690.24	5.29	7.00	7.0	5684.95	5683.24	5681.46		
40991	Alluvium/Bedrock	Qc & Kclst	5801.19	5802.67	5.90	7.40	7.4	5796.77	5795.27	5793.79		
41091	Alluvium	Qa	5719.56	5721.85	7.80	10.00	10.0	5714.05	5711.85	5709.56		
41491	Alluvium/Bedrock	Qa	5627.44	5630.21	6.80	9.67	9.4	5623.41	5620.54	5618.04		
41591	Alluvium	Qc	5725.54	5727.27	6.34	11.00	11.0	5720.93	5716.27	5714.54		
41691	Alluvium	Qa	5643.95	5645.88	5.05	14.70	14.7	5640.83	5631.18	5629.25		
45091	Alluvium	Qrf	6036.40	6038.40	24.80	39.80	30.4	6013.60	5998.60	6006		
45191	Alluvium	Qrf	6044.03	6045.98	23.90	38.90	40.9	6022.08	6007.08	6003.13		
45291	Alluvium	Qrf	6038.56	6040.51	24.30	39.30	41.8	6016.21	6001.21	5996.76		
45391	Alluvium	Qc	5891.17	5894.24	12.70	17.70		5881.54	5876.54	5891.17		
03092	Alluvium	Qrf	6058.20	6060.90	20.00	30.00		6040.90	6030.90	6058.2		
03192	Alluvium	Qrf	6066.00	6068.58	20.00	30.00		6048.58	6038.58	6066		
10092	Alluvium	Qc	5898.42	5900.47	5.21	18.77	18.6	5895.26	5881.70	5879.82		
10192	Alluvium	Qc	5922.66	5924.30	4.93	16.84	16.4	5919.37	5907.46	5906.26		
10292	Bedrock	Ksltclst & Kcslt	5923.79	5925.46	17.98	22.71	15.2	5907.48	5902.75	5908.59		
10392	Alluvium	Qc	5930.23	5932.05	5.52	25.20	24.8	5926.53	5906.85	5905.43		
10492	Bedrock	Kcss & Ksltclst	5930.83	5932.81	25.88	30.33	22.6	5906.93	5902.48	5908.23		
10592	Alluvium	Qc	5936.14	5937.93	4.74	23.99	23.5	5933.19	5913.94	5912.64		
10692	Alluvium	Qc	5941.50	5943.60	5.03	19.40	18.9	5938.57	5924.20	5922.6		
10792	Bedrock	Ksltss	5915.02	5917.10	17.65	22.41	16.2	5899.45	5894.69	5898.82		
10892	Bedrock	Kss, Ksltclst & Kclst	5928.10	5929.20	18.53	23.39	15.5	5910.67	5905.81	5912.6		
10992	Alluvium	Qc	5896.85	5898.56	7.94	29.44	29.2	5890.62	5869.12	5867.65		
11092	Alluvium	Qc	5893.33	5895.31	5.00	19.00	18.6	5890.31	5876.31	5874.73		
43392	Alluvium	Qrf	6041.86	6043.44	25.55	30.25	31.4	6017.89	6013.19	6010.46	claystone	CL
43492	Alluvium/Bedrock	Qrf & Kclst	5990.09	5991.09	36.10	41.00	39.4	5954.99	5950.09	5950.69	claystone	GC
46192	Alluvium	Qrf	6141.50	6143.37	57.89	77.89	77.0	6085.48	6065.48	6064.5	claystone	GC
46292	Alluvium	Qrf	6095.30	6097.24	45.87	90.87	90.5	6051.37	6006.37	6004.8	silty claystone	GM
46392	Bedrock	Kclst	6063.20	6065.03	64.87	79.87	56.0	6000.16	5985.16	6007.2	claystone	GM
46492	Alluvium	Qrf	6054.70	6056.81	28.63	43.63	43.0	6028.18	6013.18	6011.7	siltstone	SM
46692	Bedrock	Ksltss, Ksslt & Kclst	5956.20	5958.25	72.33	87.33	24.5	5885.92	5870.92	5931.7		
46792	Bedrock	Ksslt, Kcslt & Kslt	5956.30	5958.44	97.14	112.14	24.5	5861.30	5846.30	5931.8		
46892	Bedrock	Ksltss, Ksslt & Kclst	5956.70	5958.56	147.40	162.40	24.5	5811.16	5796.16	5932.2		

288


WELL 1286
ALUMINIUM
CONCENTRATION (ug/L)
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
WATER LEVEL (ft)
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

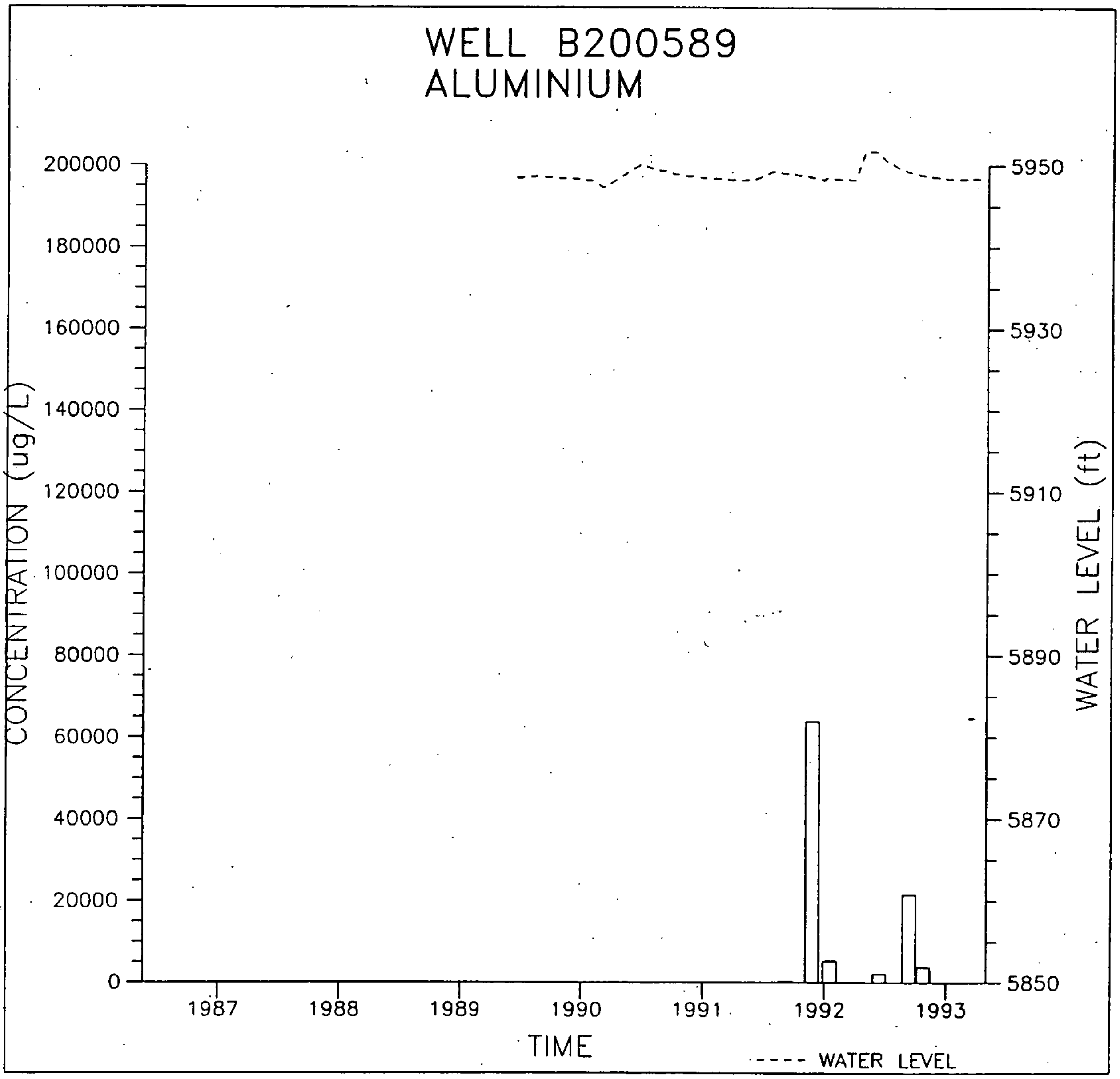
289

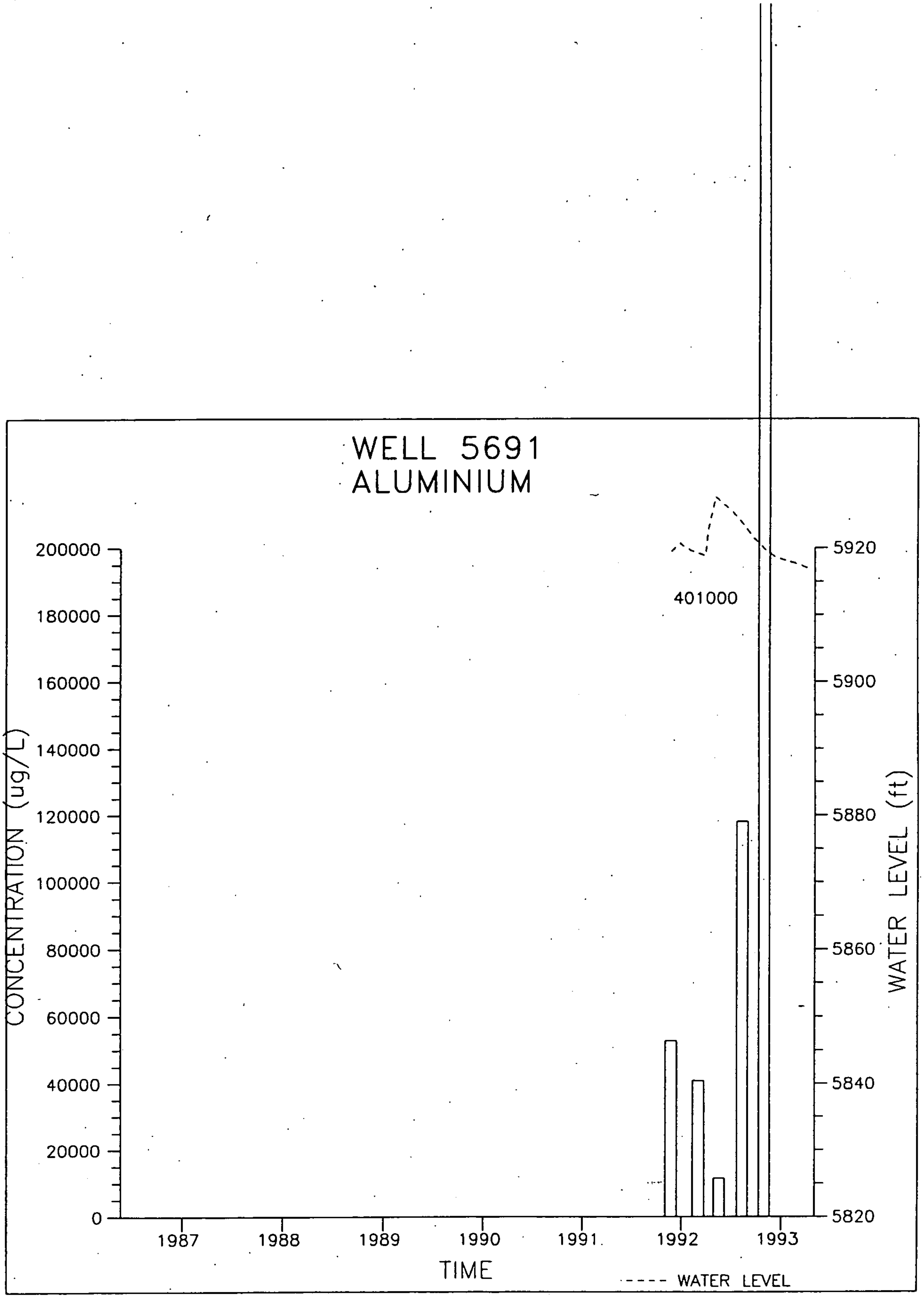
~~289~~



WELL 7287
ALUMINIUM
CONCENTRATION (ug/L)
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
456000
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

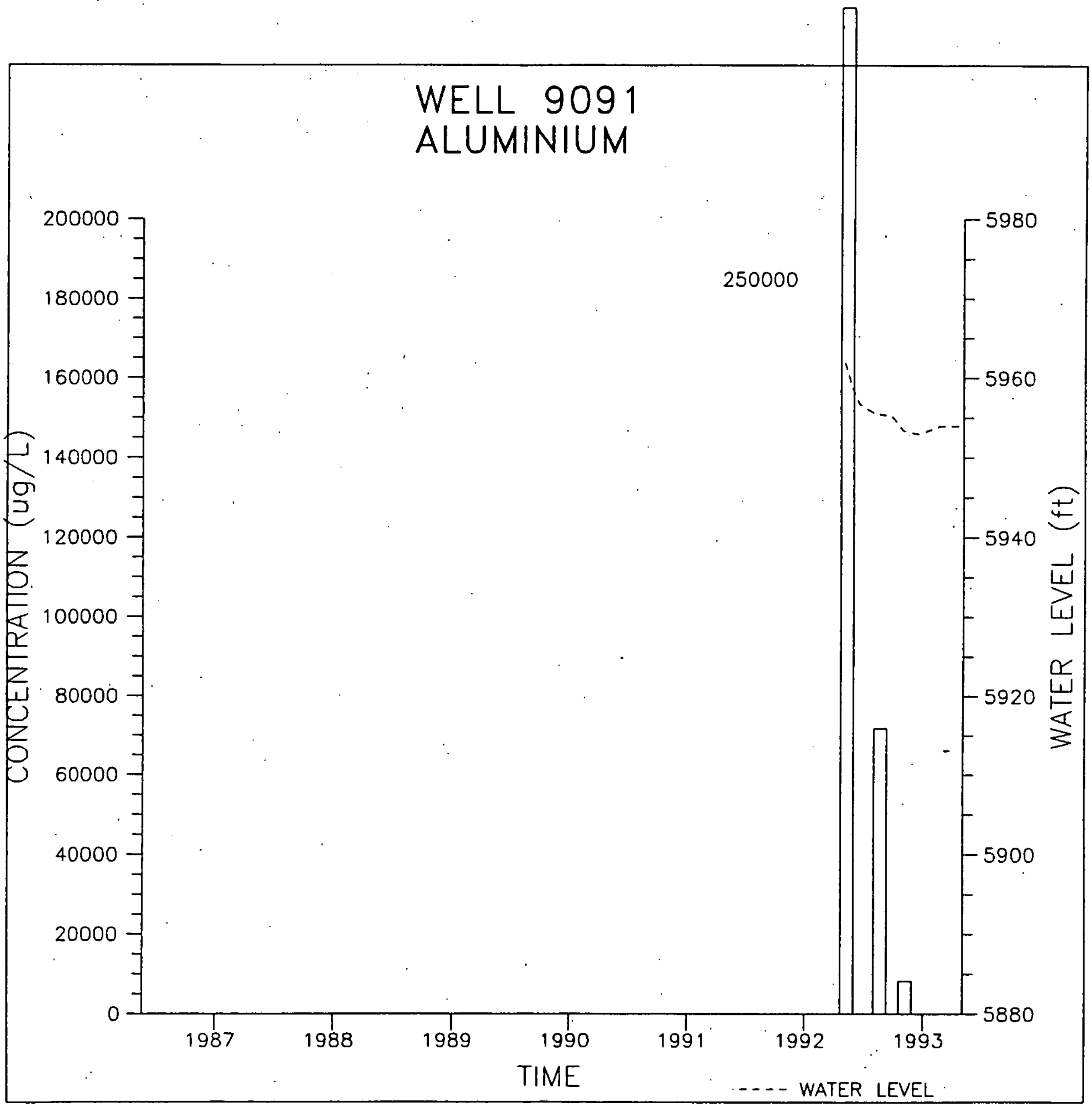
290


WELL B200589
ALUMINIUM
CONCENTRATION (ug/L)
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

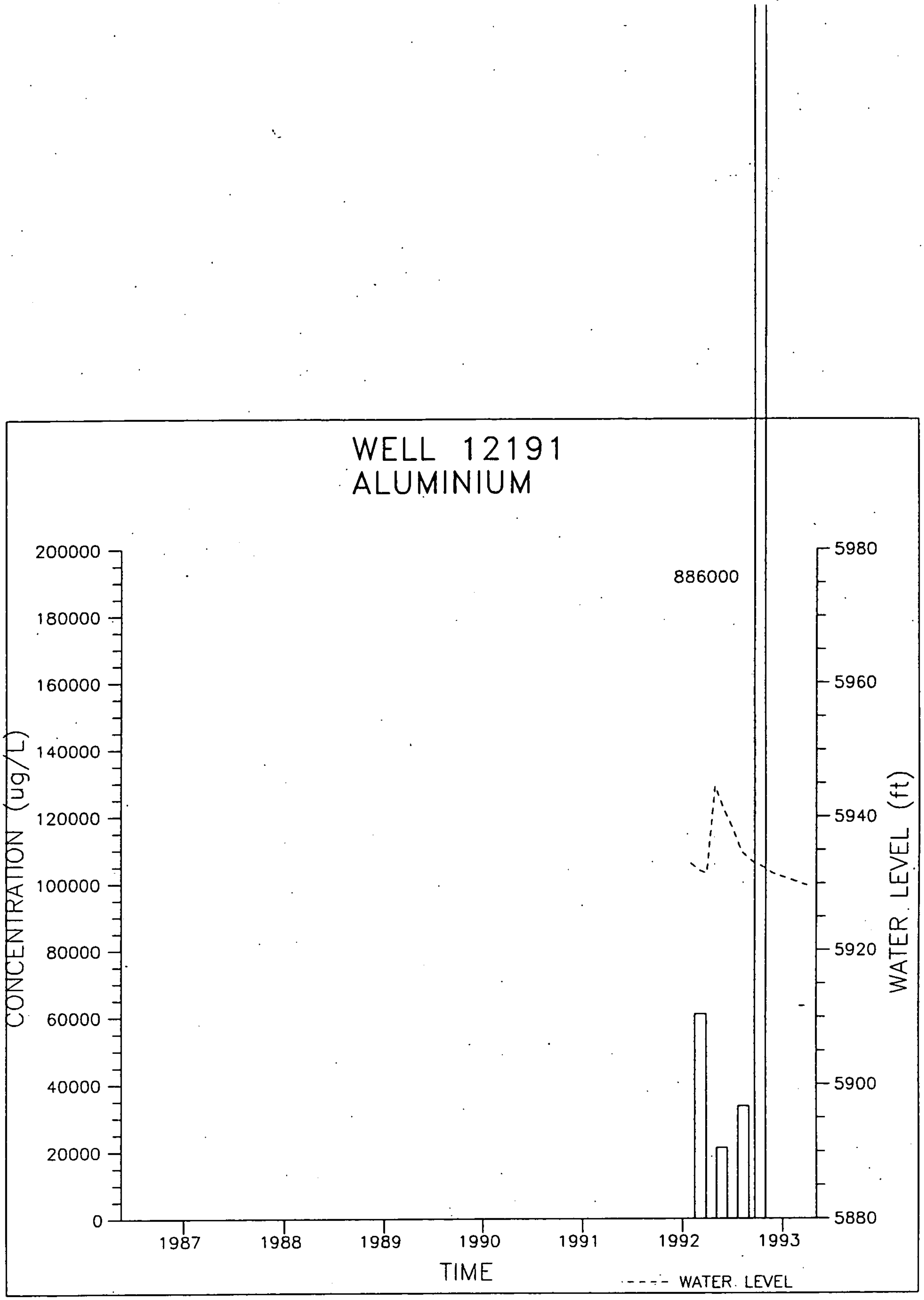


WELL 5691
ALUMINIUM
401000
CONCENTRATION (ug/L)
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

292

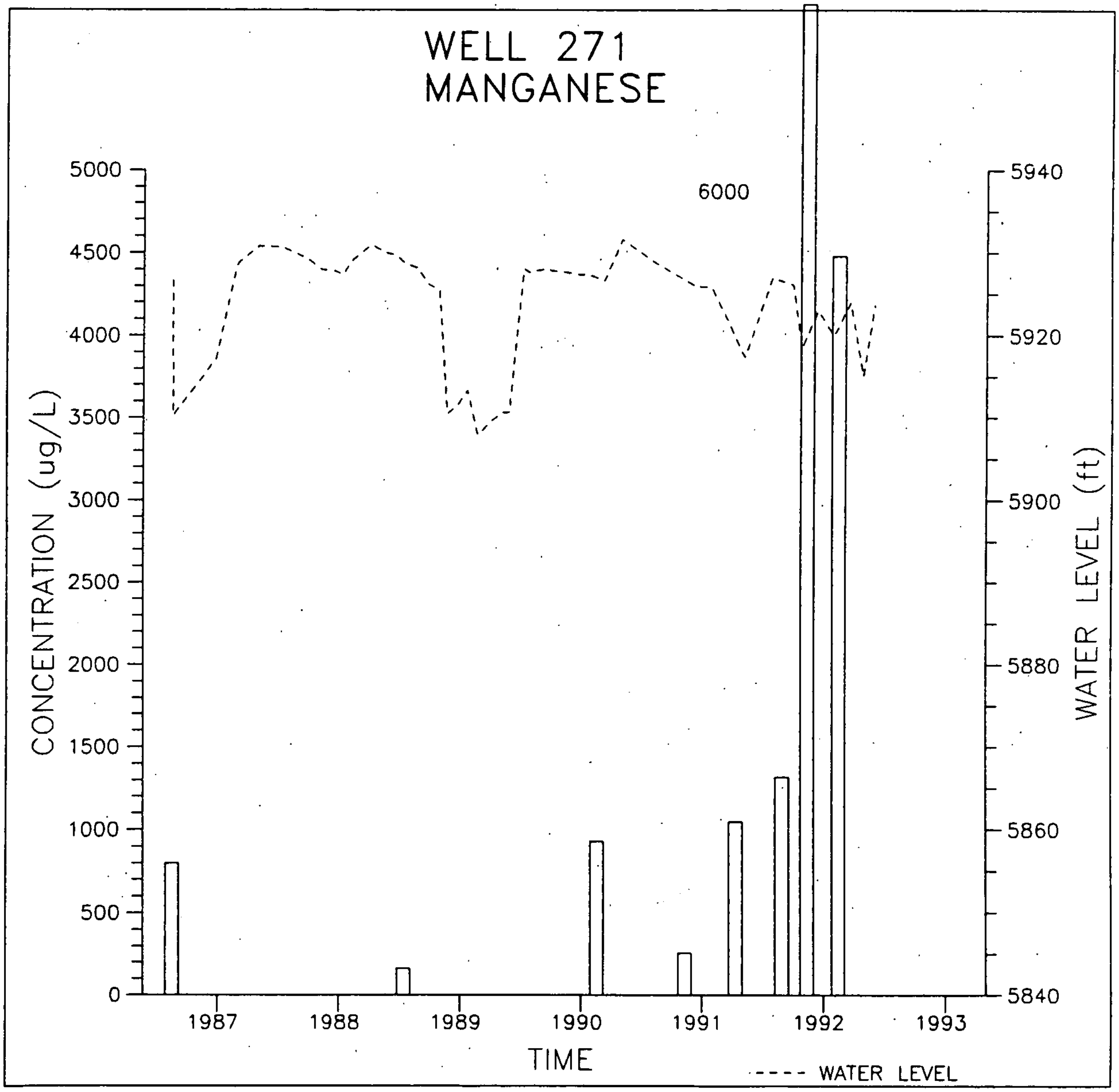

WELL 9091
ALUMINIUM
250000
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20000
40000
60000
80000
100000
120000
140000
160000
180000
200000
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

293



WELL 12191
ALUMINIUM
886000
200000
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

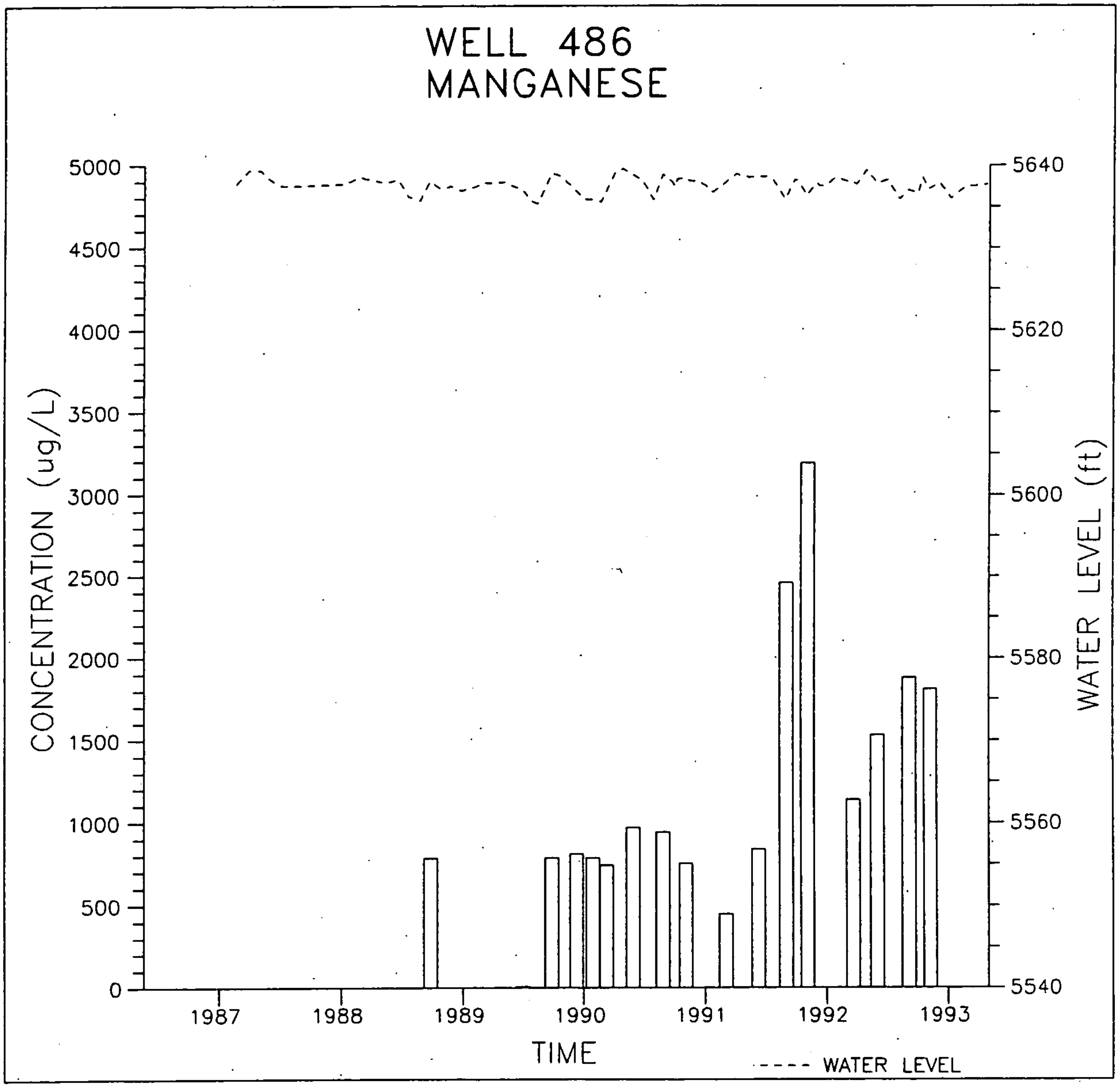
294



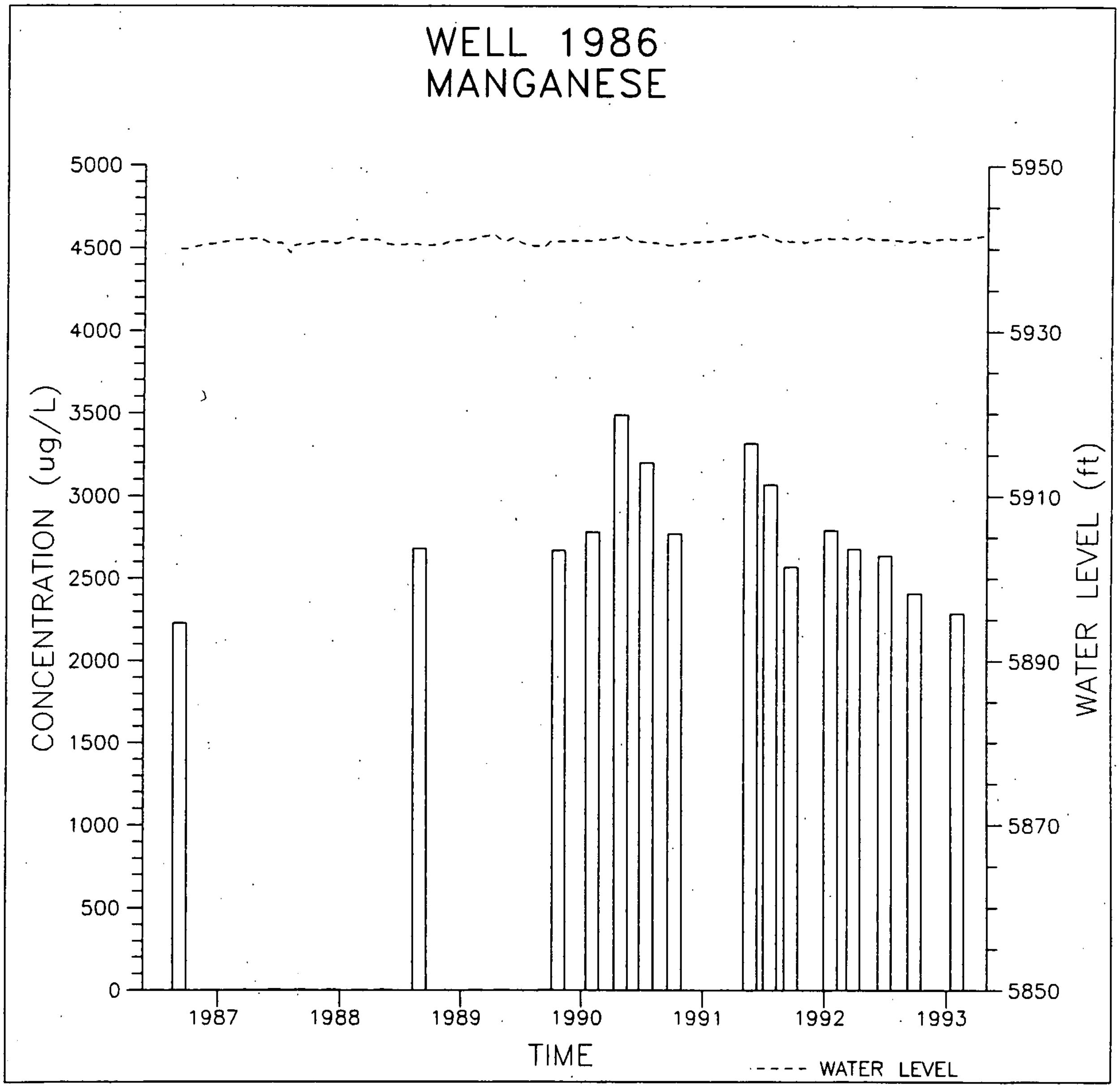
WELL 271
MANGANESE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
6000
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

295

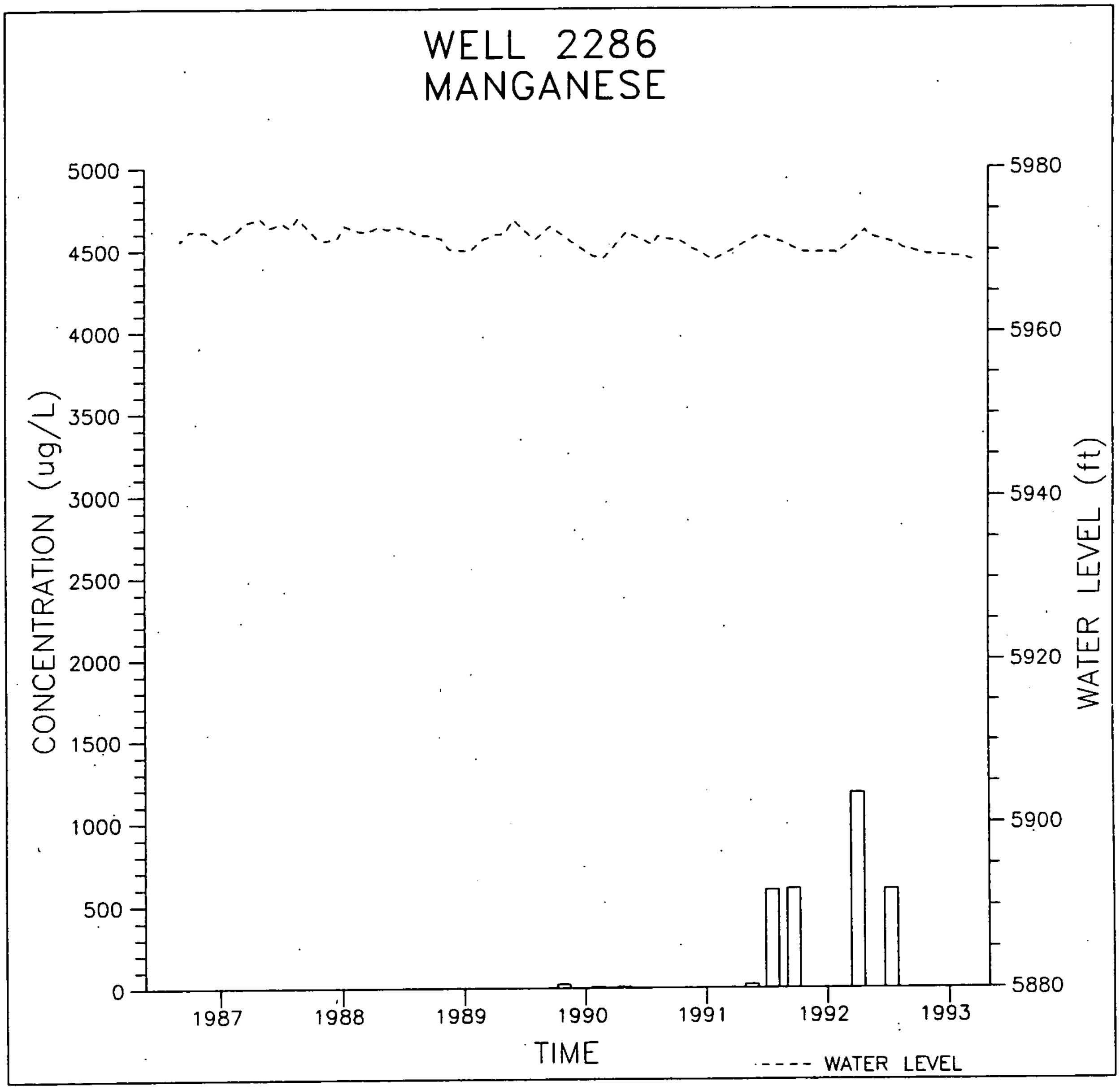
295



WELL 486
MANGANESE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5540
5560
5580
5600
5620
5640
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL


WELL 1986
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

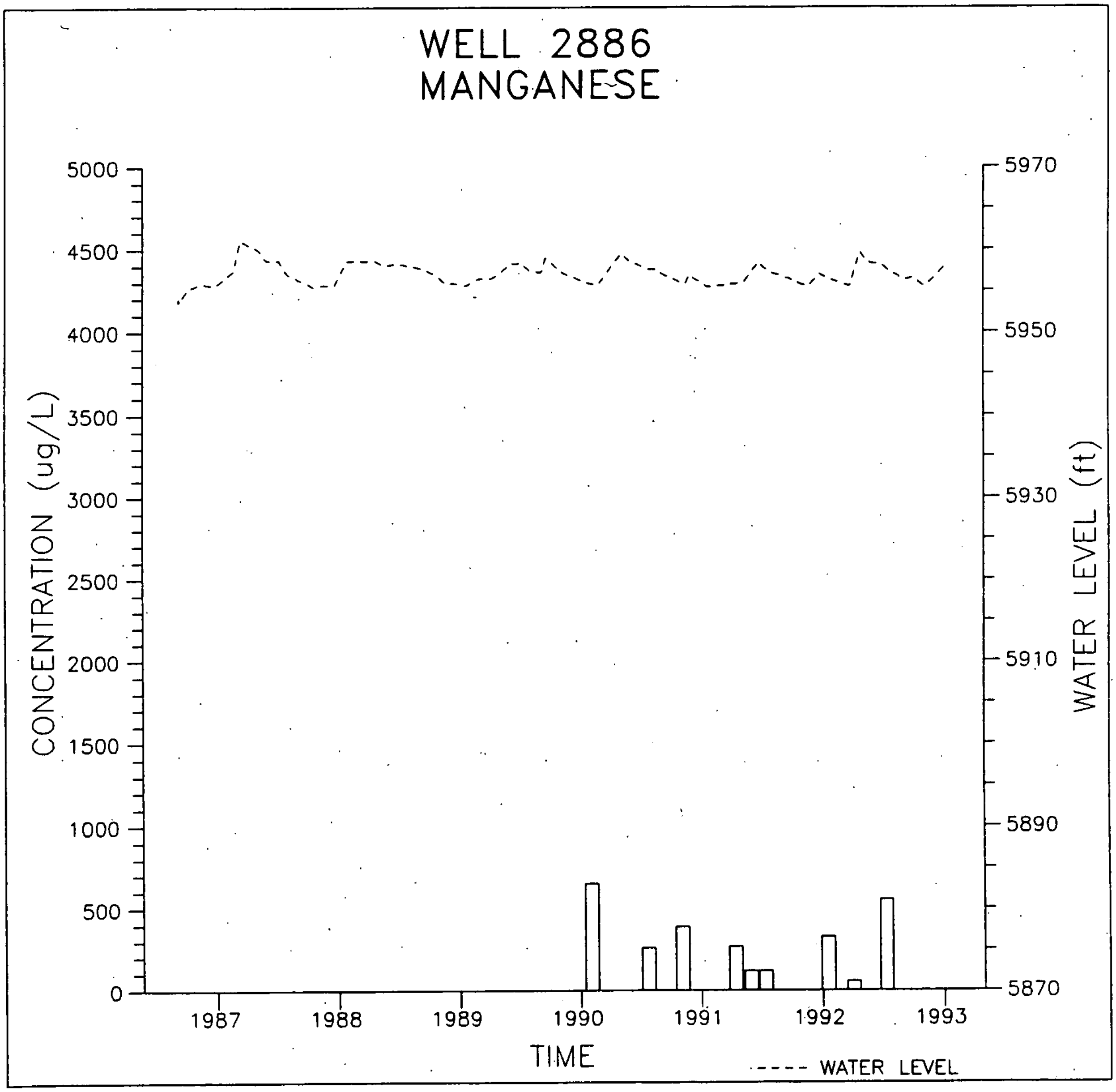
291



WELL 2286
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

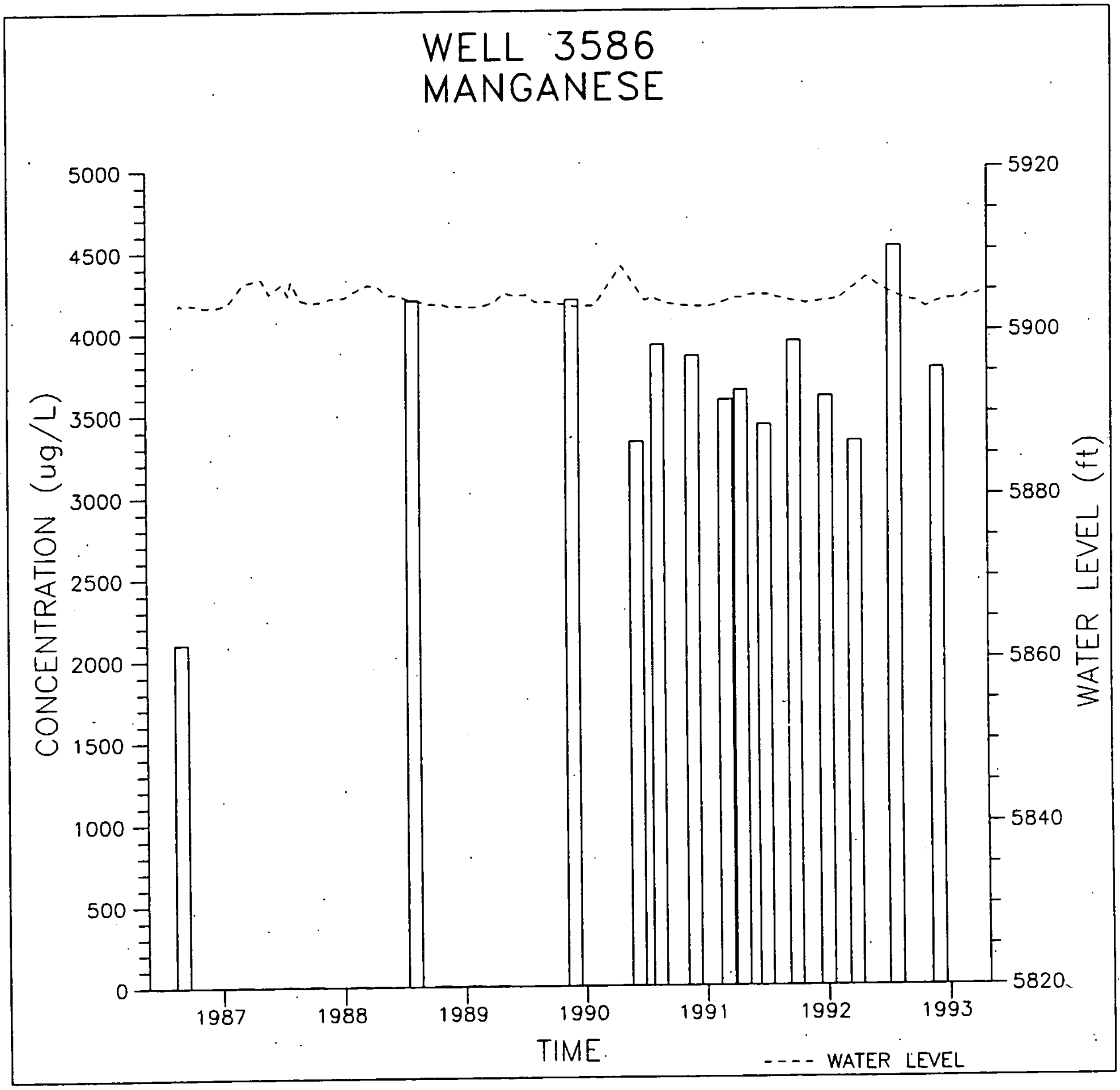
298

298


WELL 2886
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

299

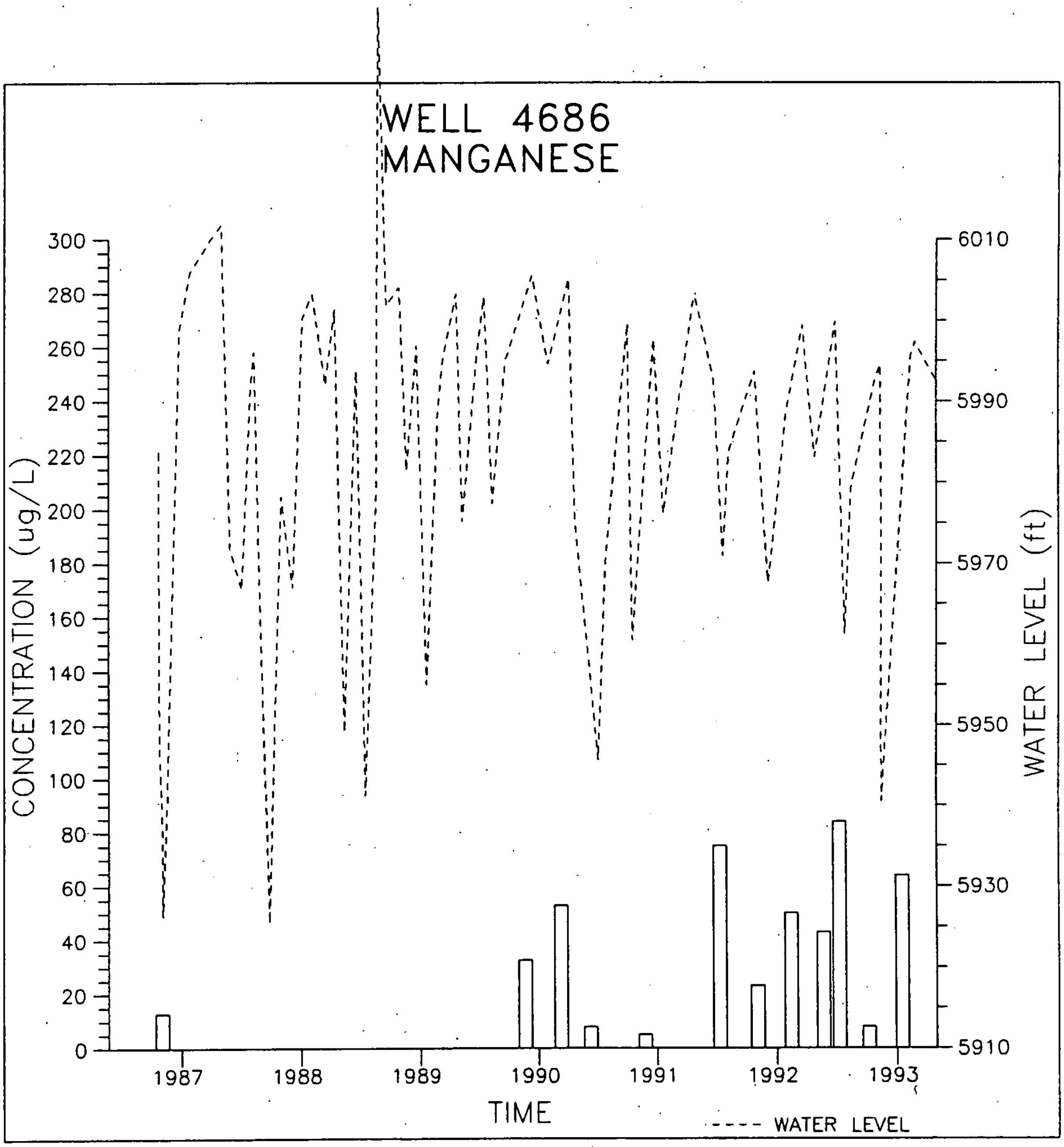
299



WELL 3586
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

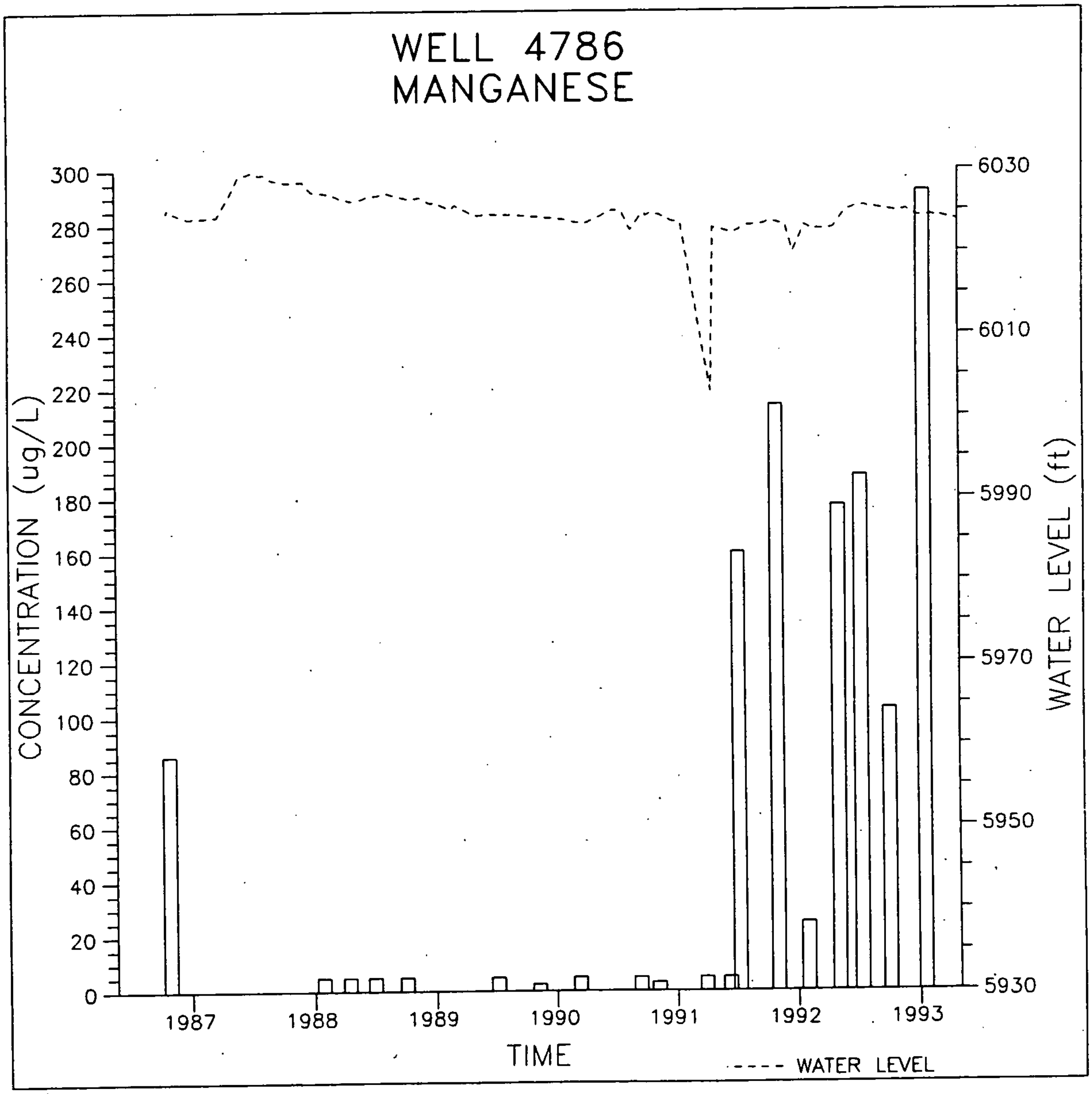
300

300

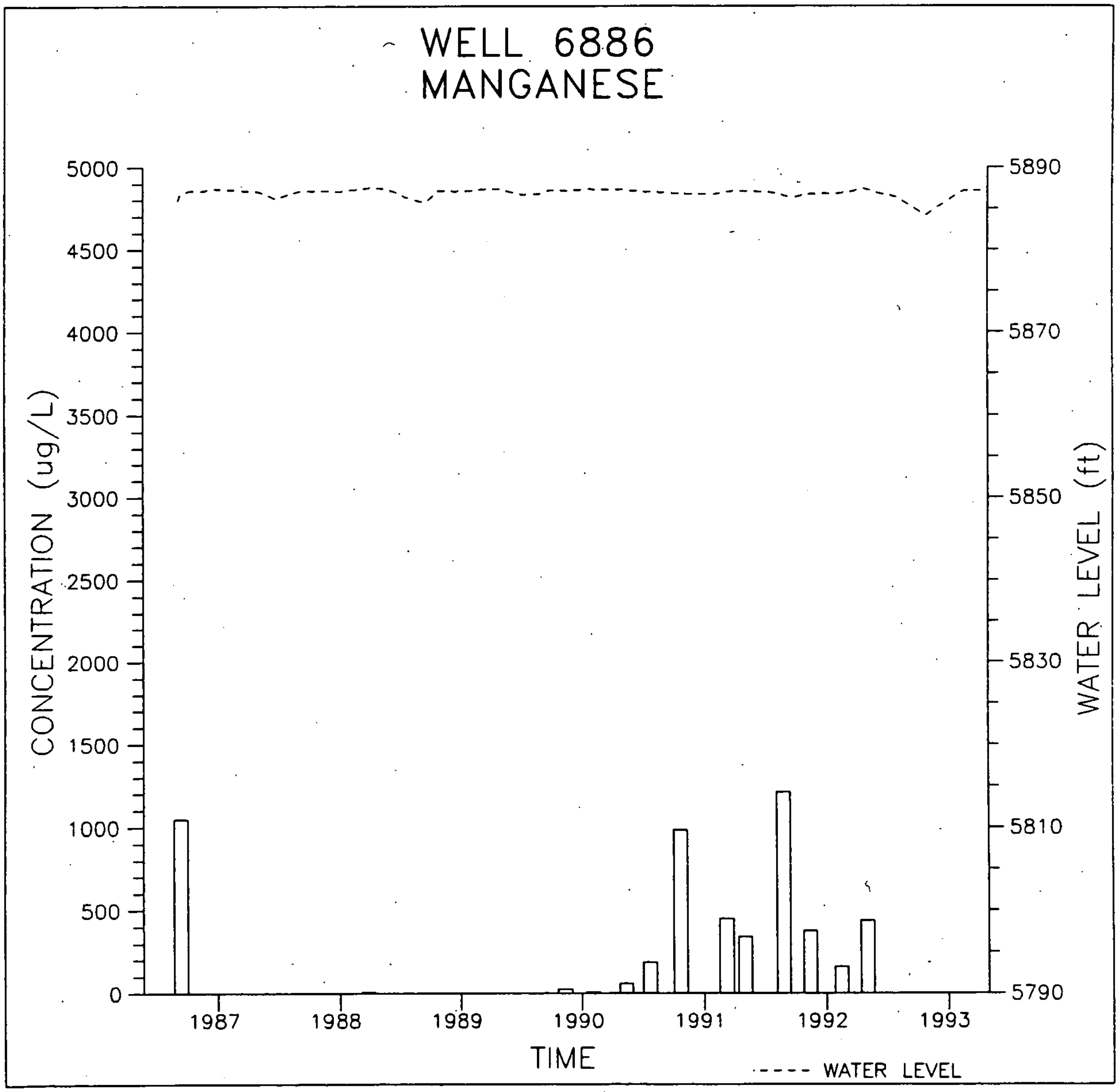


WELL 4686
MANGANESE
CONCENTRATION (ug/L)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
6010
5990
5970
5950
5930
5910
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

301



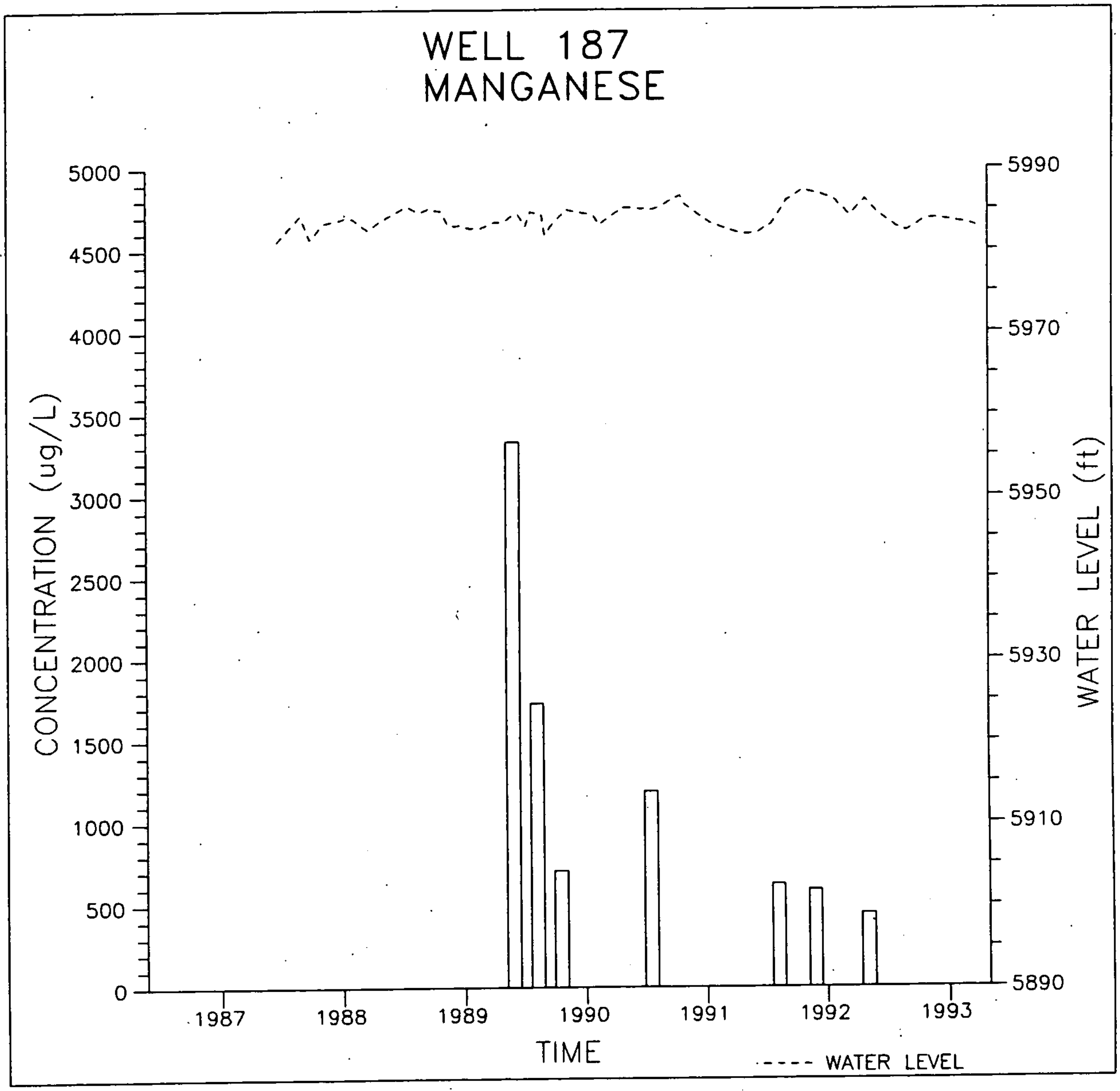
WELL 4786
MANGANESE
CONCENTRATION (ug/L)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6030
6010
5990
5970
5950
5930
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL 6886
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

303

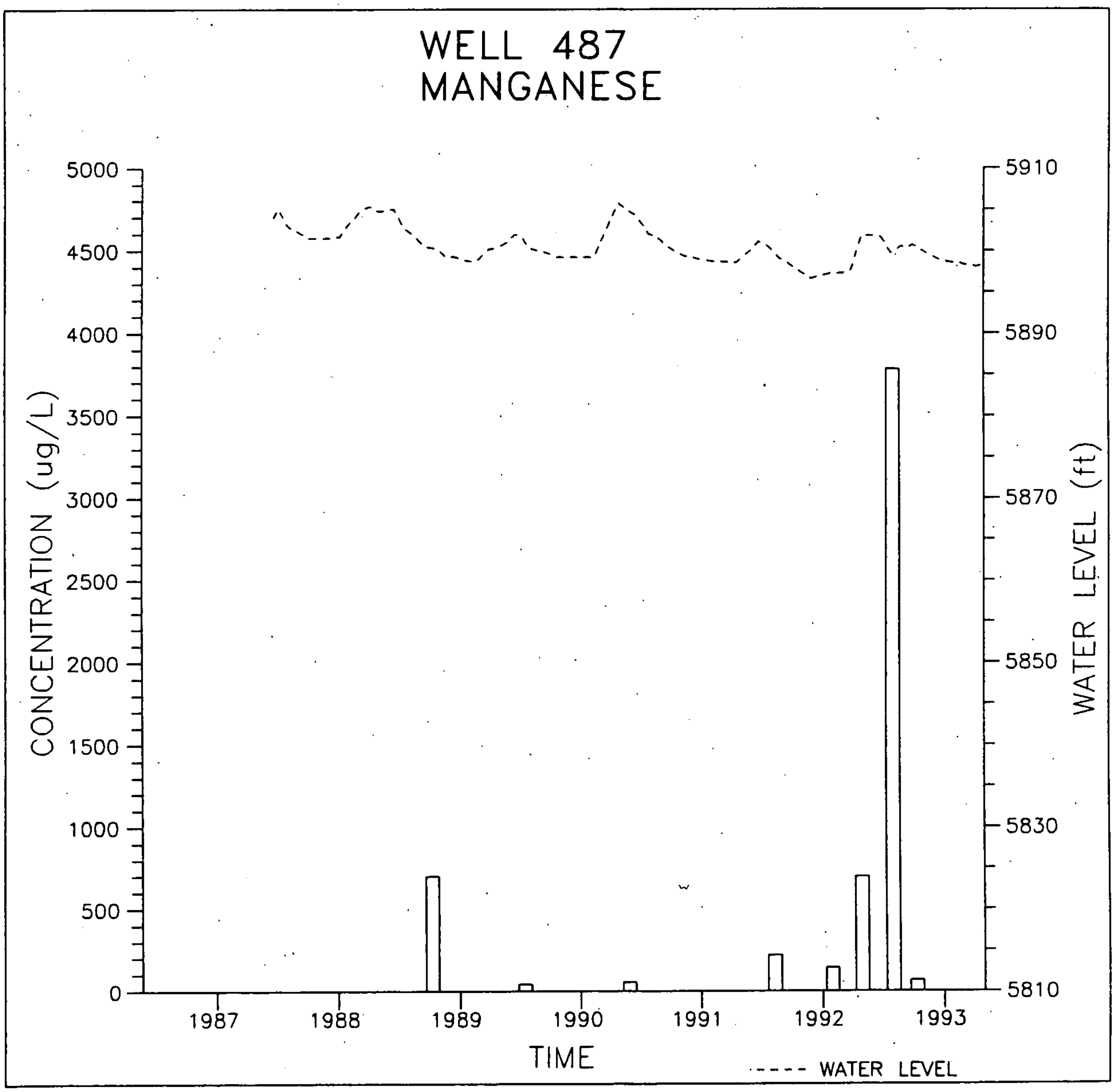
303

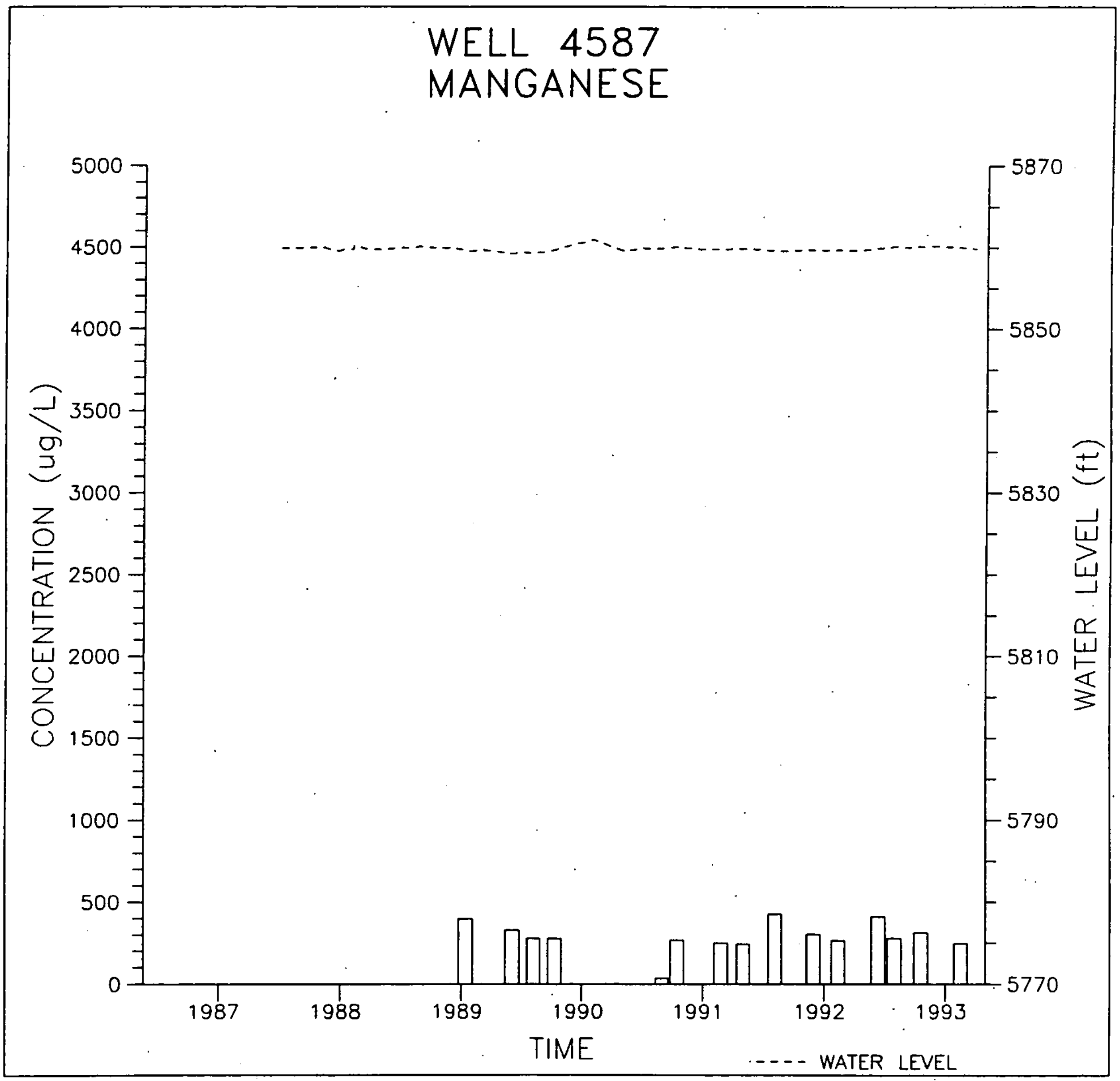


WELL 187
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5990
5970
5950
5930
5910
5890
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

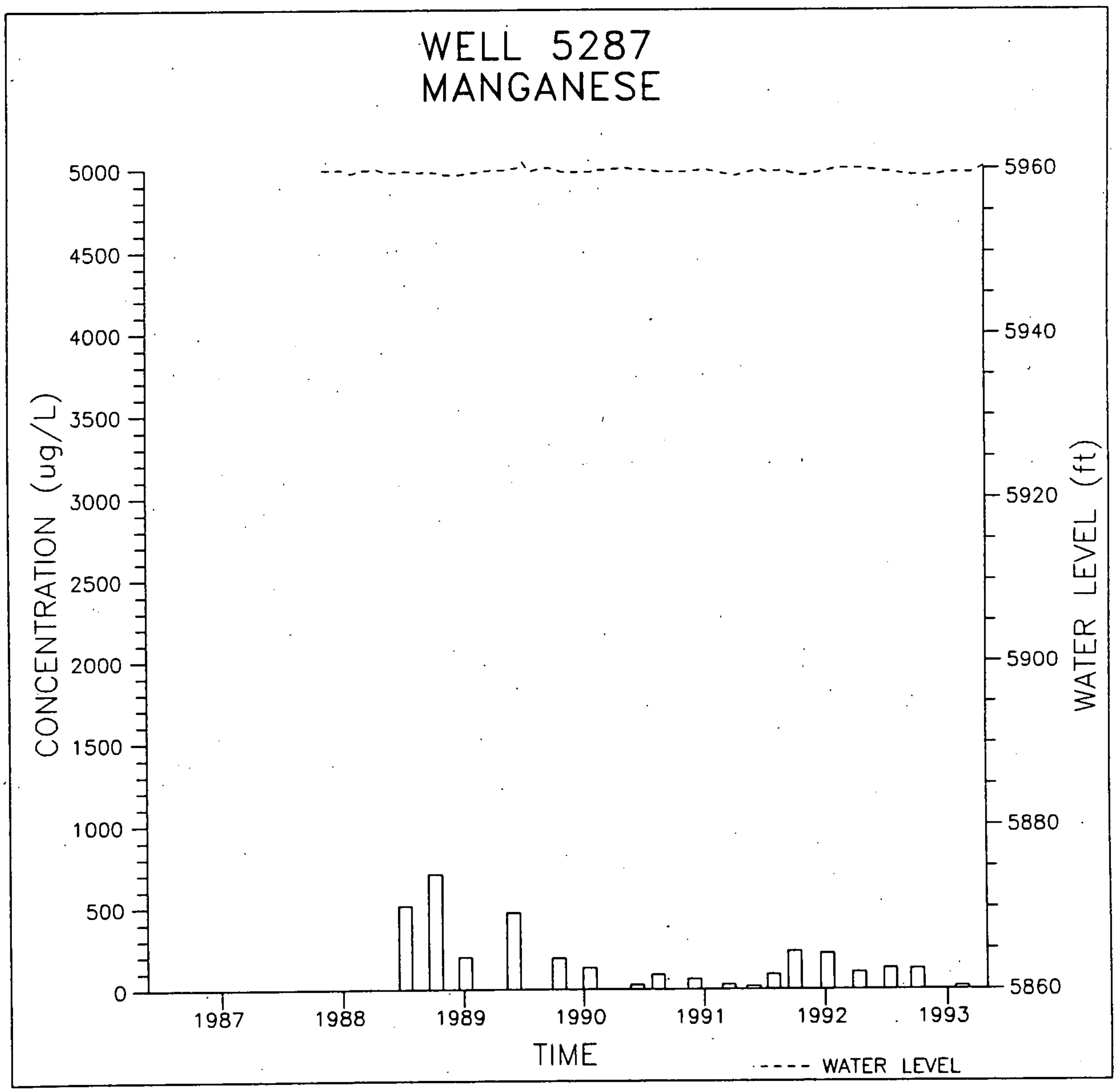
304

304


WELL 487
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



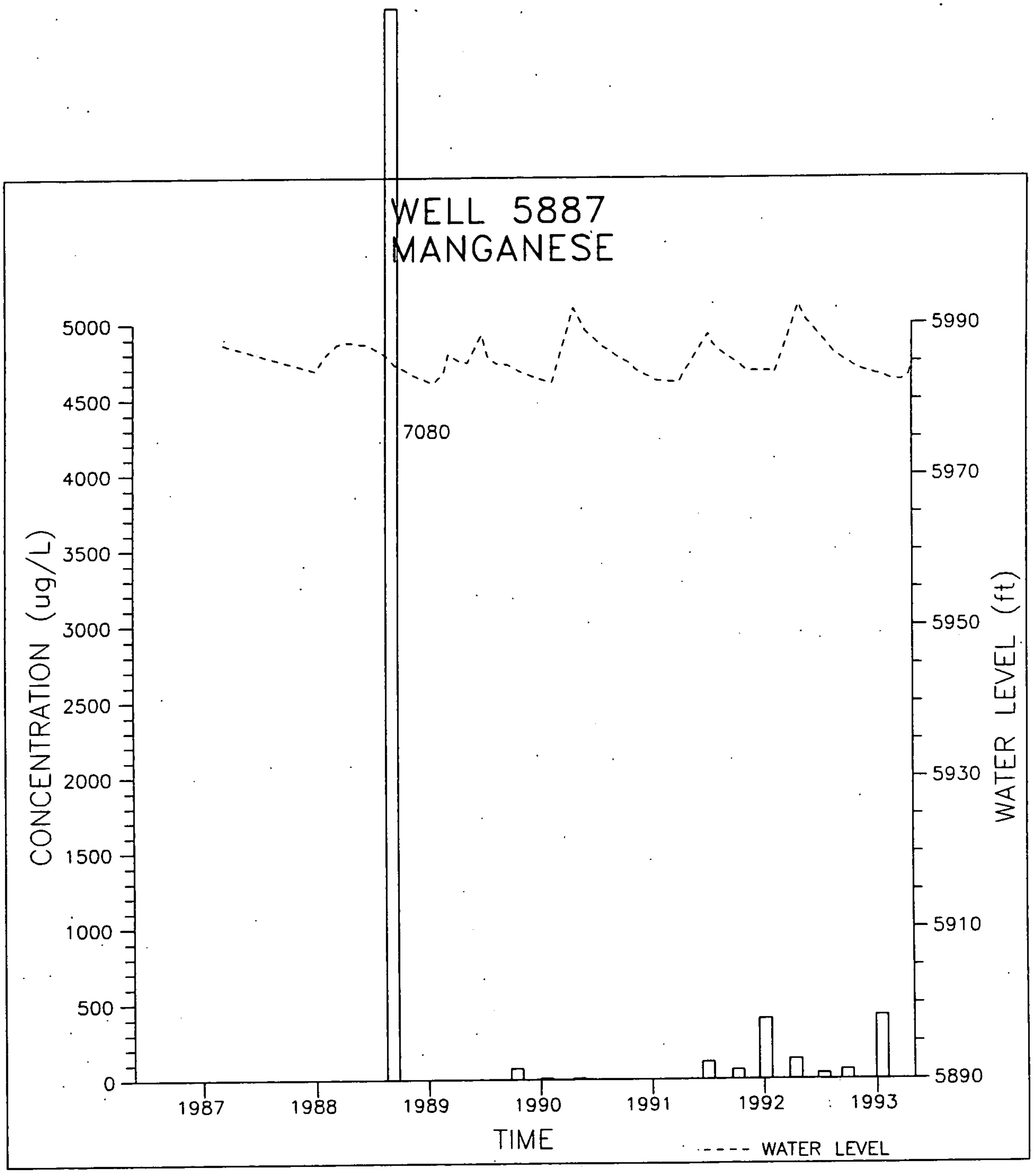
WELL 4587
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL 5287
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

301

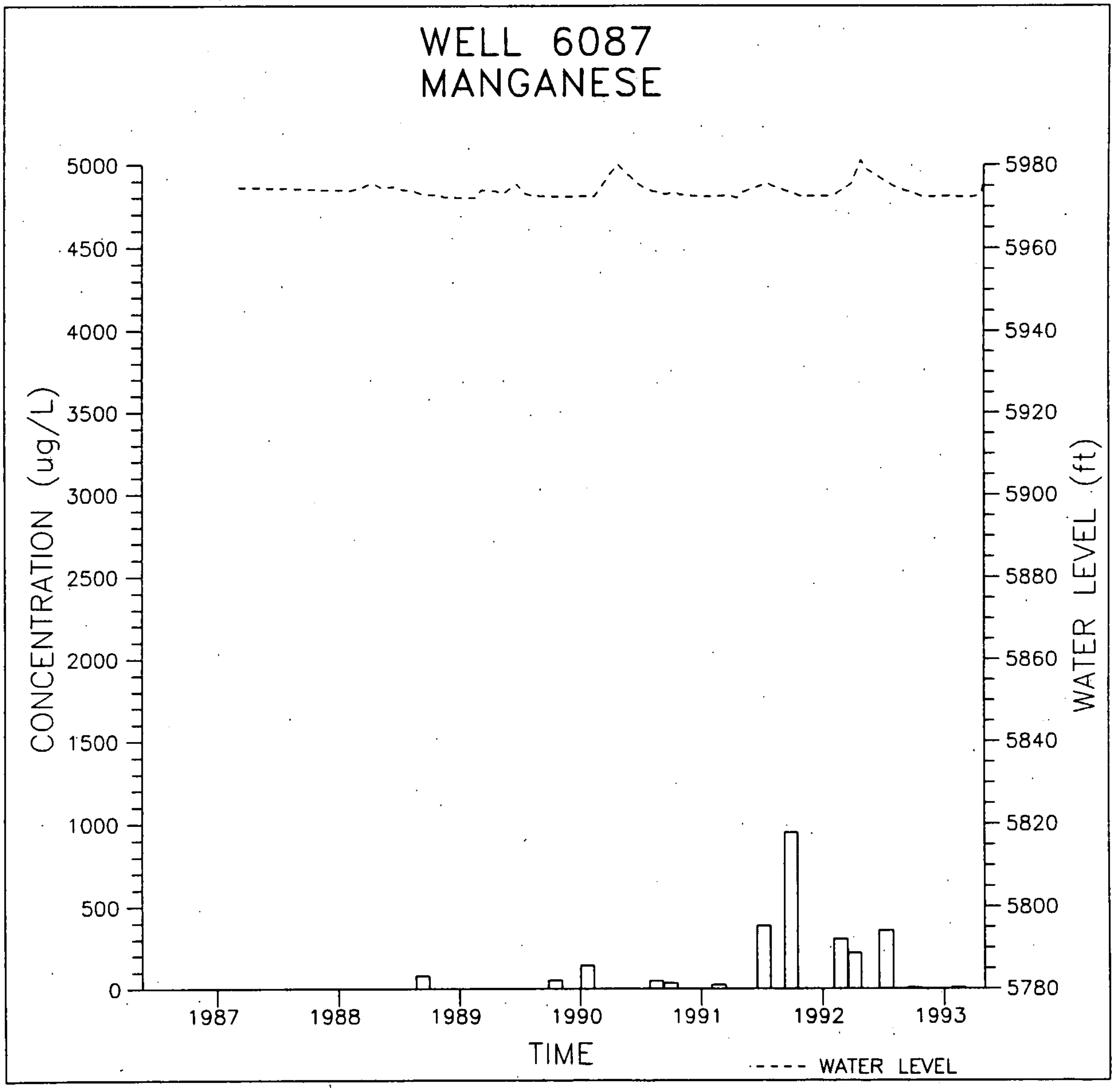
307



WELL 5887
MANGANESE
7080
CONCENTRATION (ug/L)
WATER LEVEL (ft)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

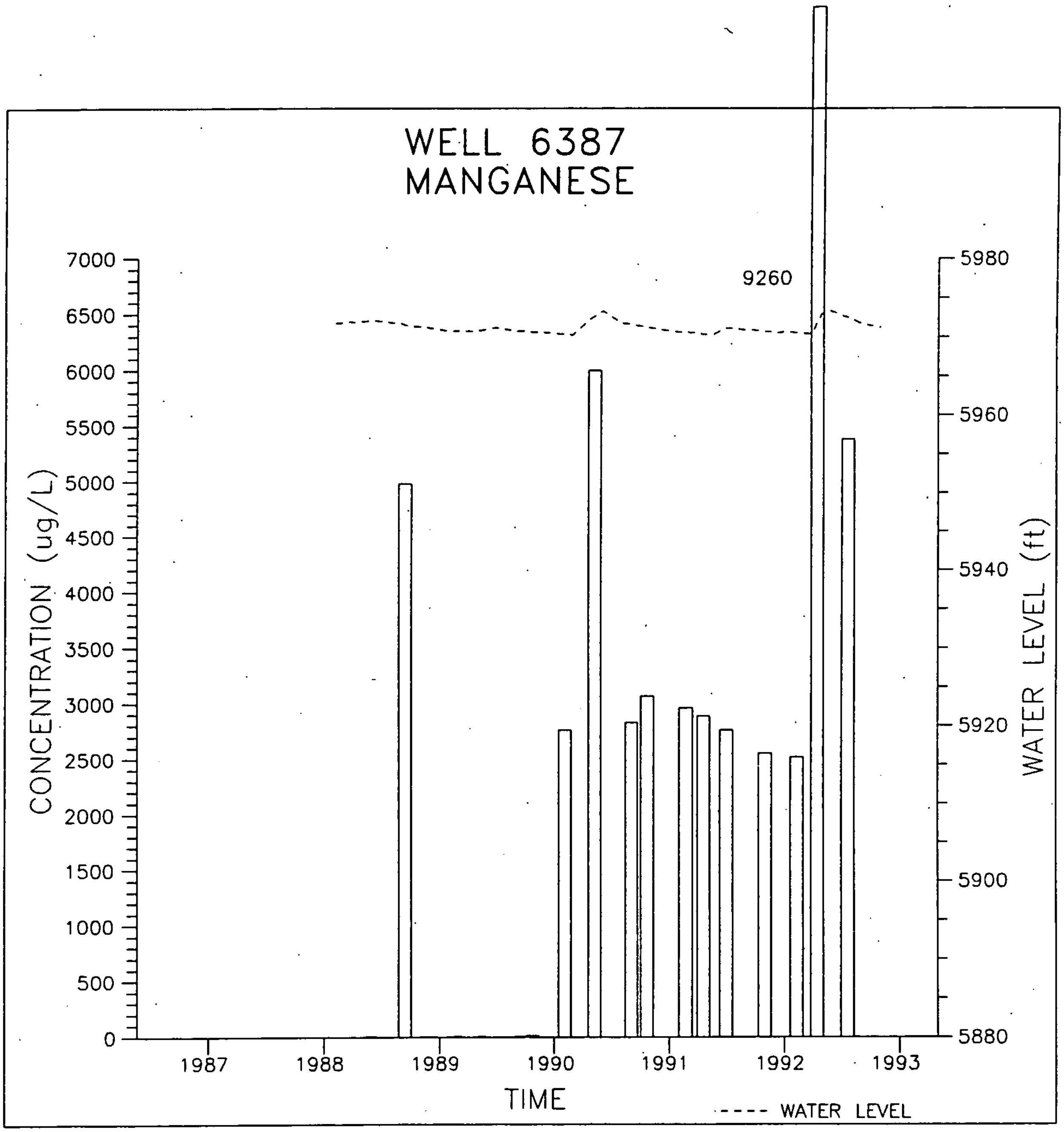
308

308

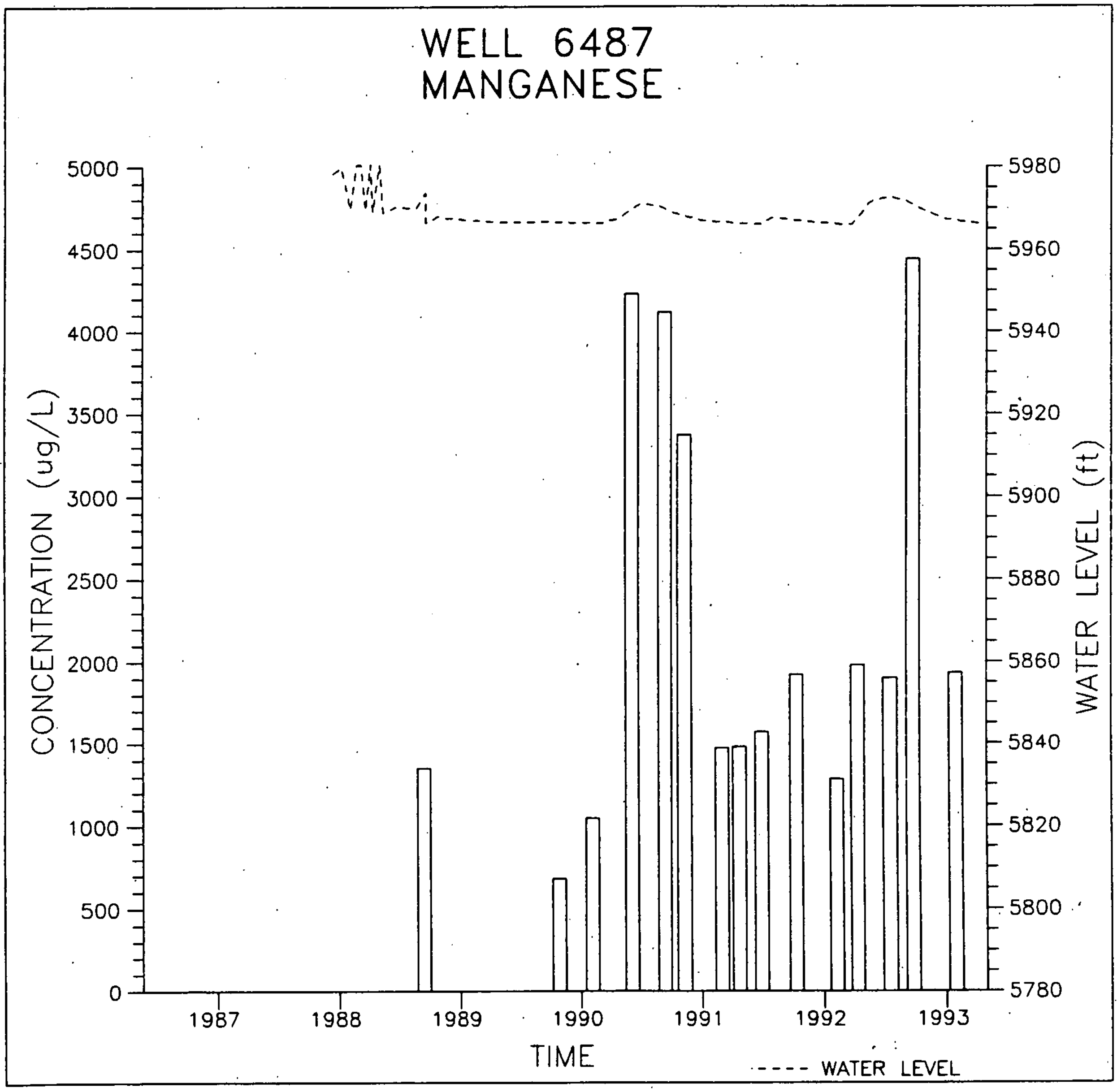


WELL 6087
MANGANESE
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

309



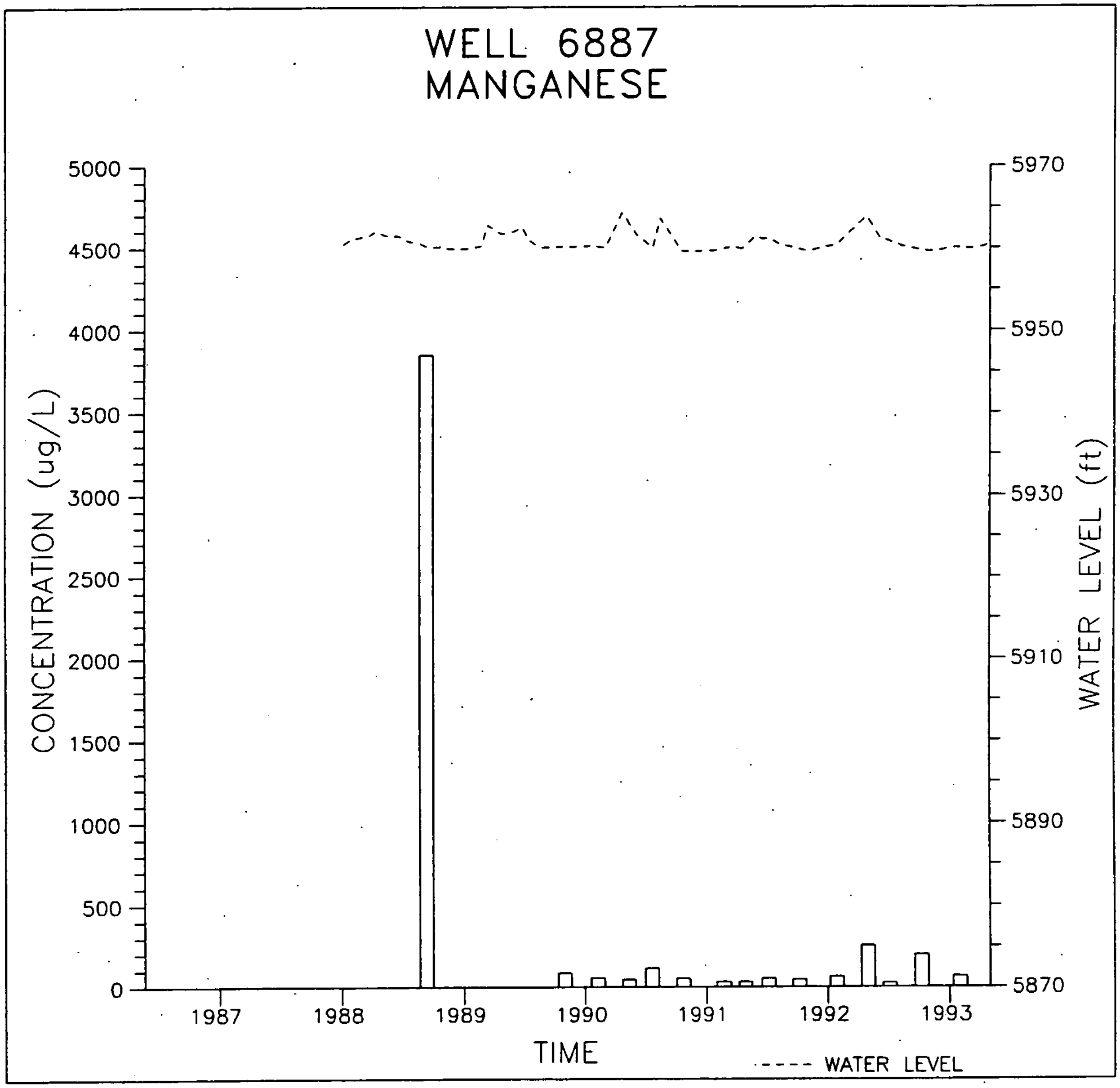
WELL 6387
MANGANESE
CONCENTRATION (ug/L)
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
9260
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

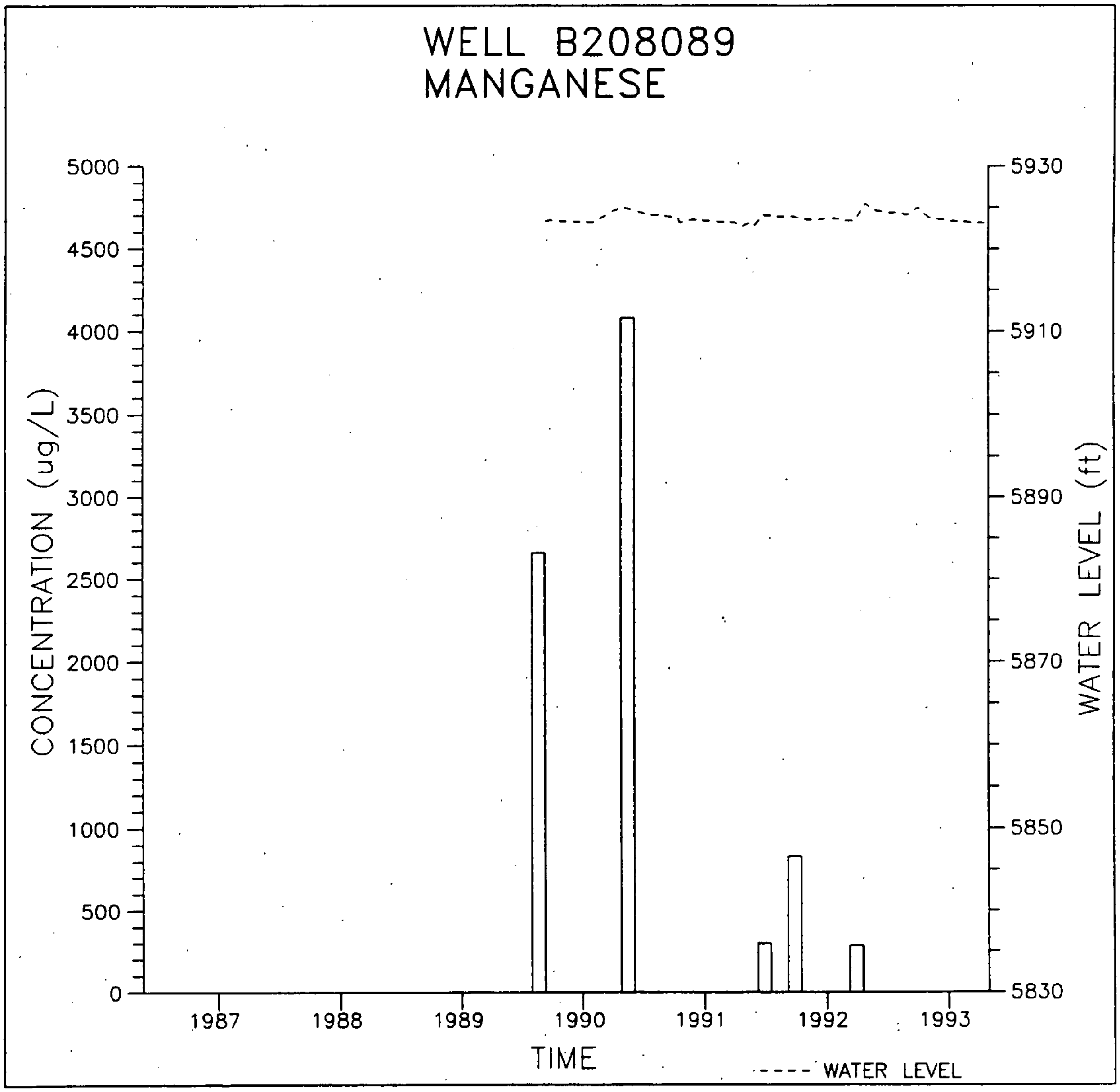


WELL 6487
MANGANESE
CONCENTRATION (ug/L)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
WATER LEVEL (ft)
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

311

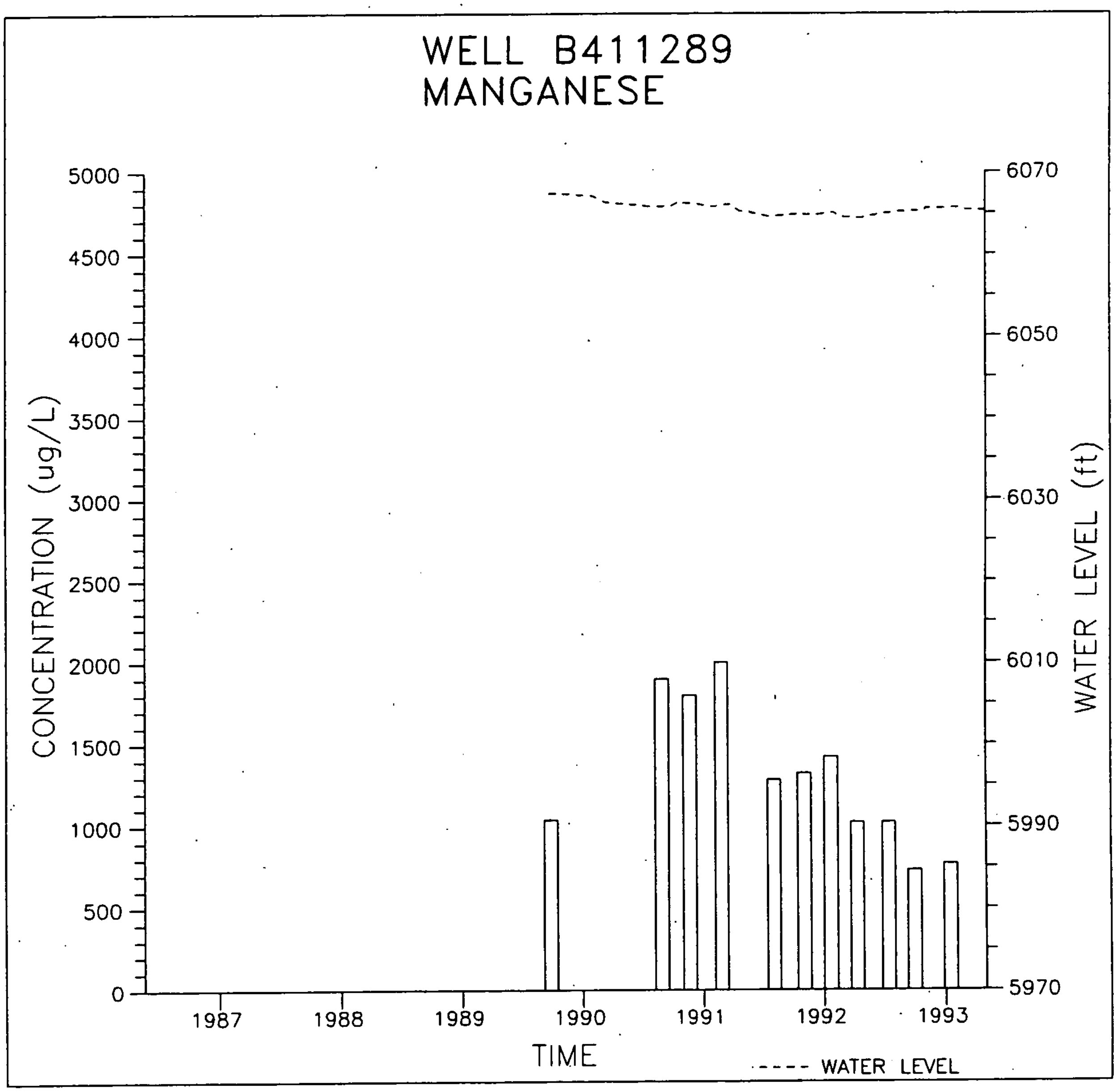
~~311~~


WELL 6887
MANGANESE
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
CONCENTRATION (ug/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

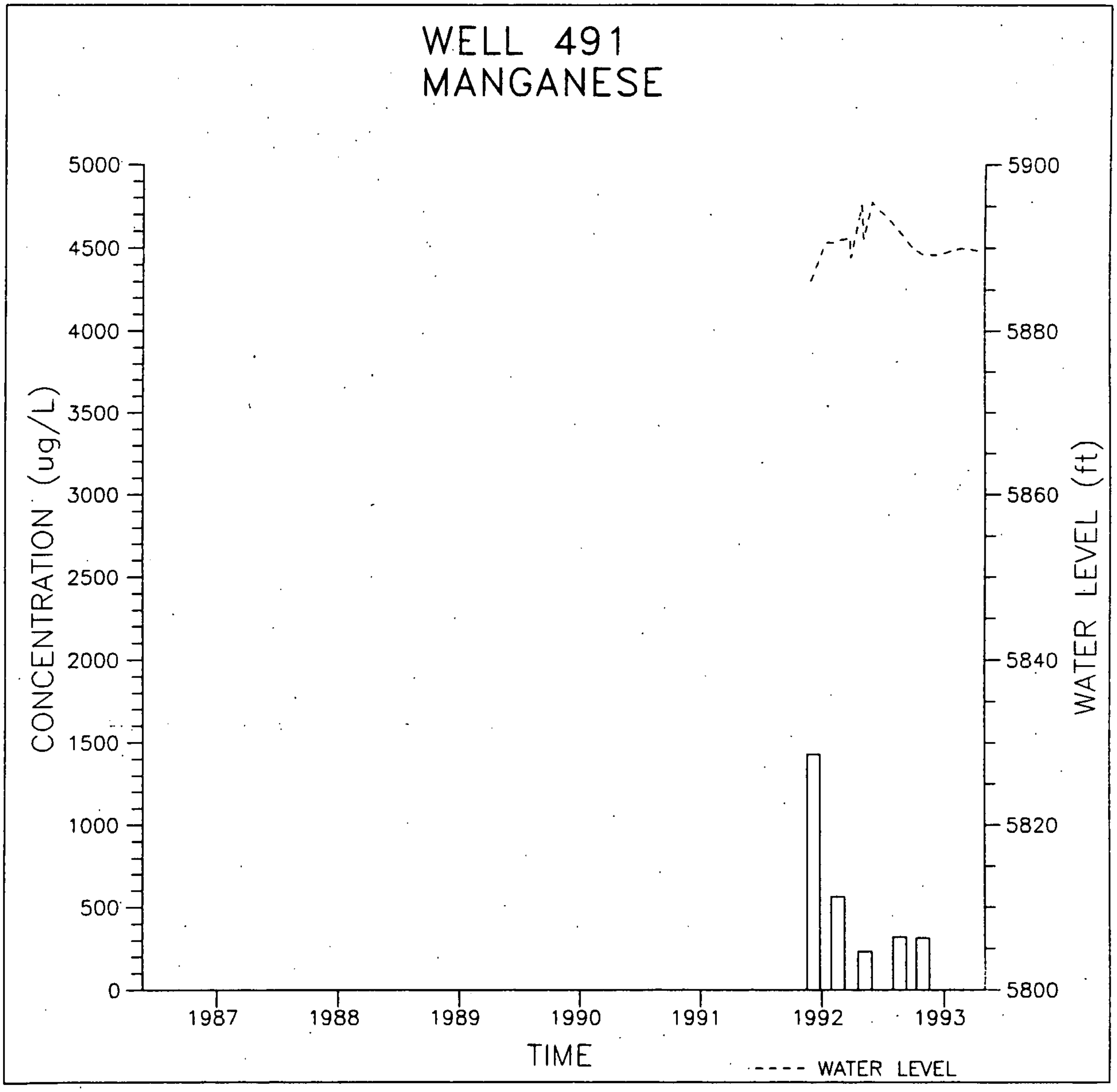


WELL B208089
MANGANESE
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

313


WELL B411289
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
6070
6050
6030
6010
5990
5970
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

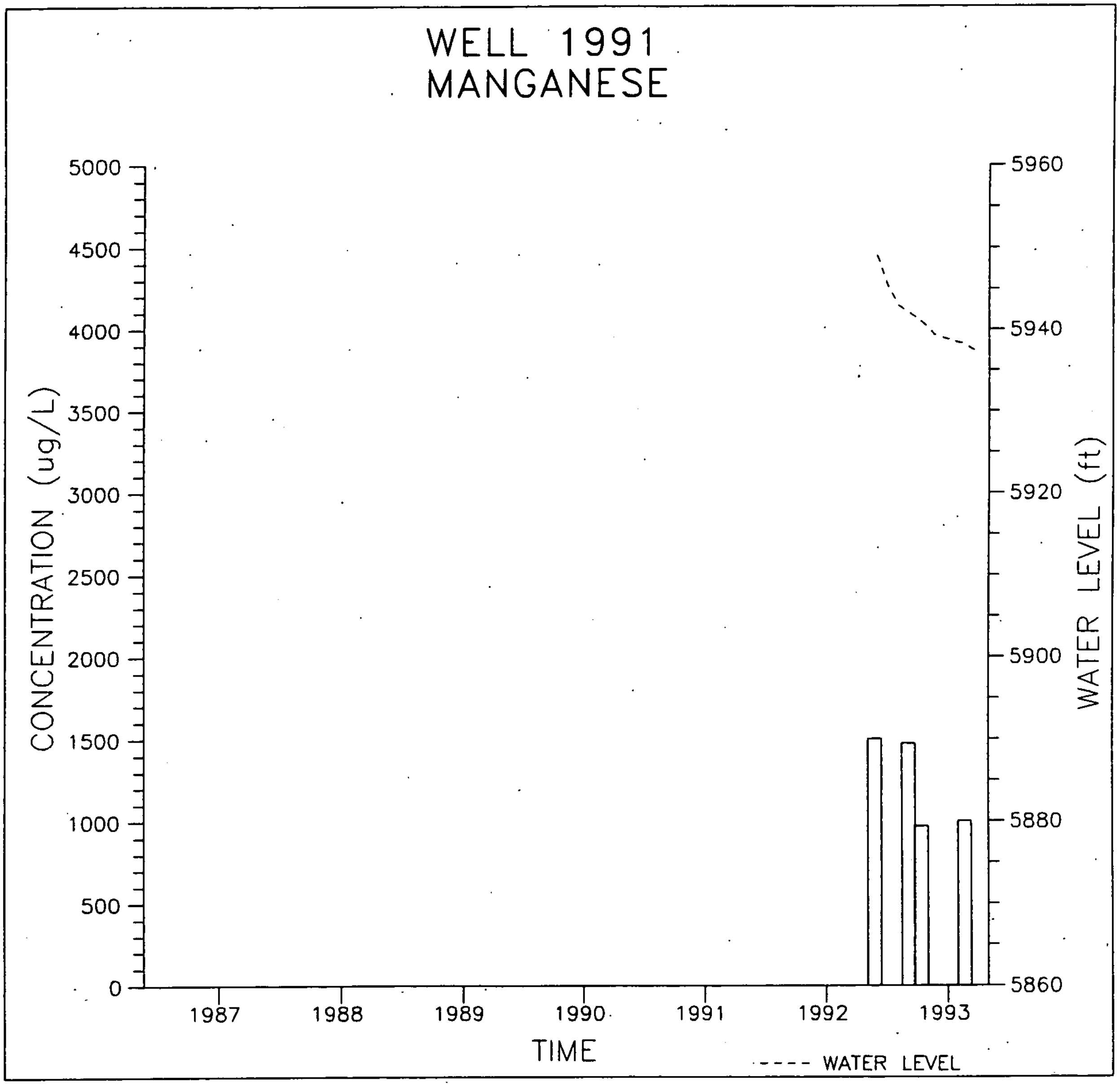
314



WELL 491
MANGANESE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

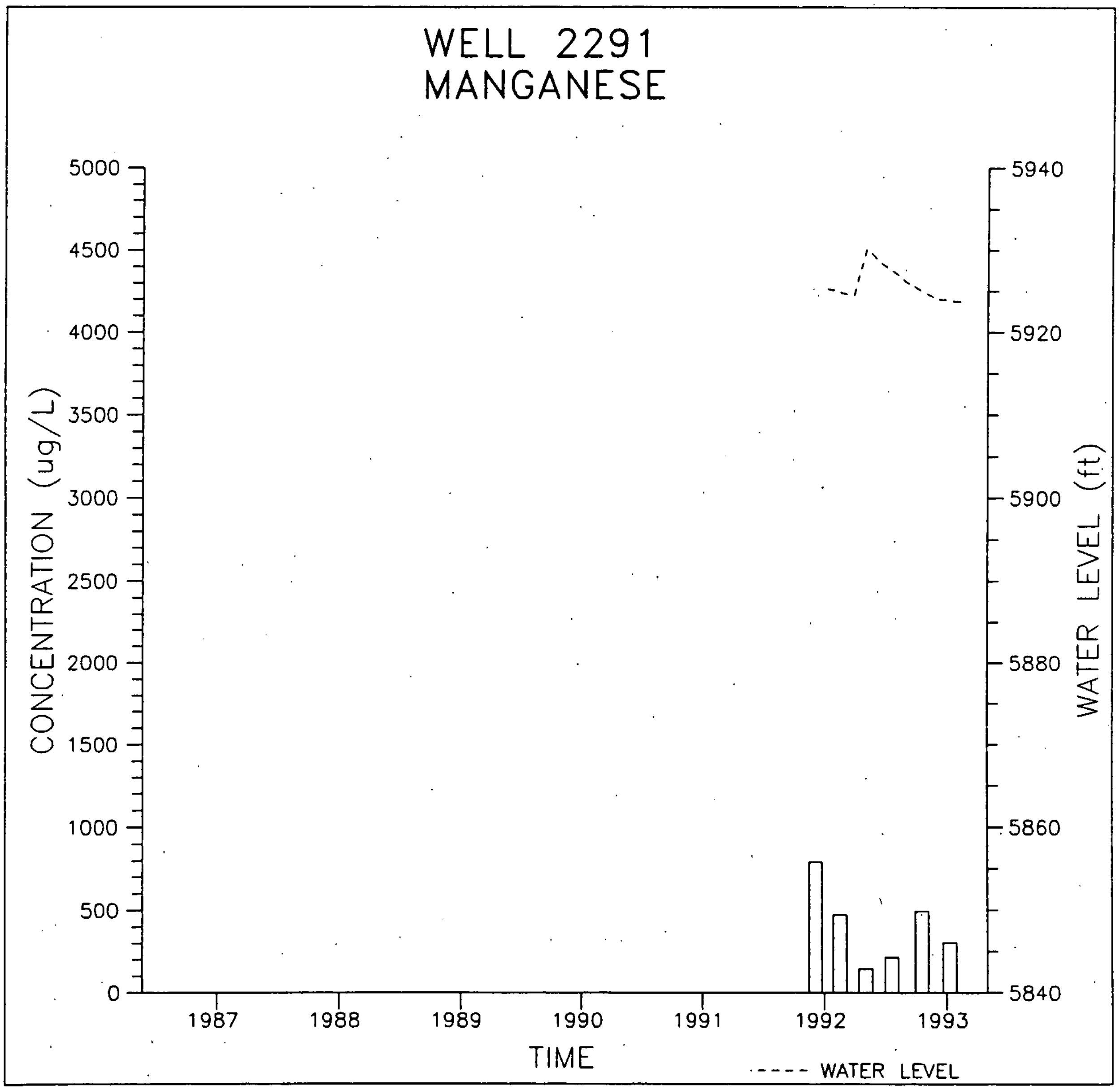
315

315


WELL 1991
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
5960
5940
5920
5900
5880
5860
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

316

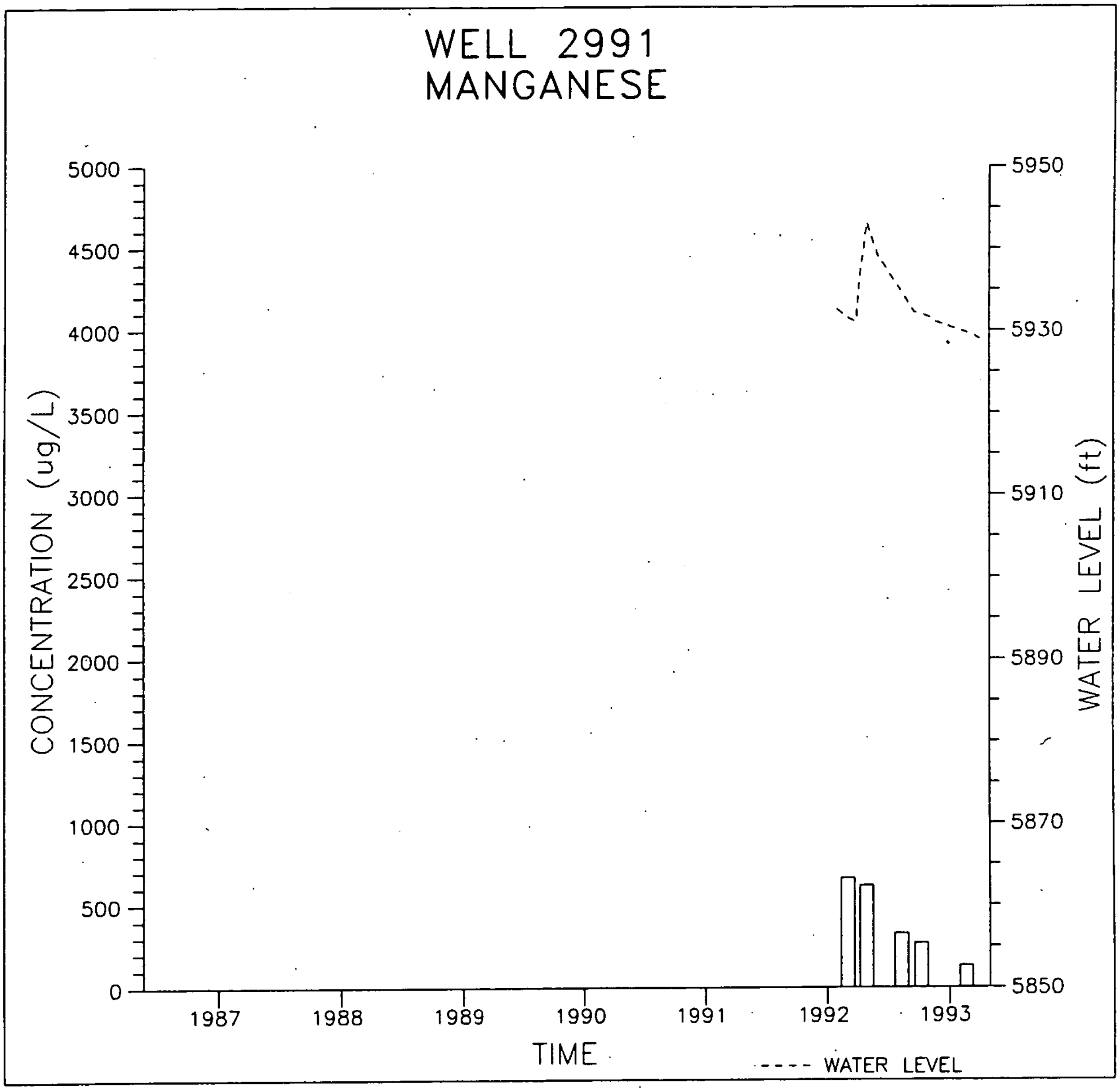
316



WELL 2291
MANGANESE
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
CONCENTRATION (ug/L)
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

317

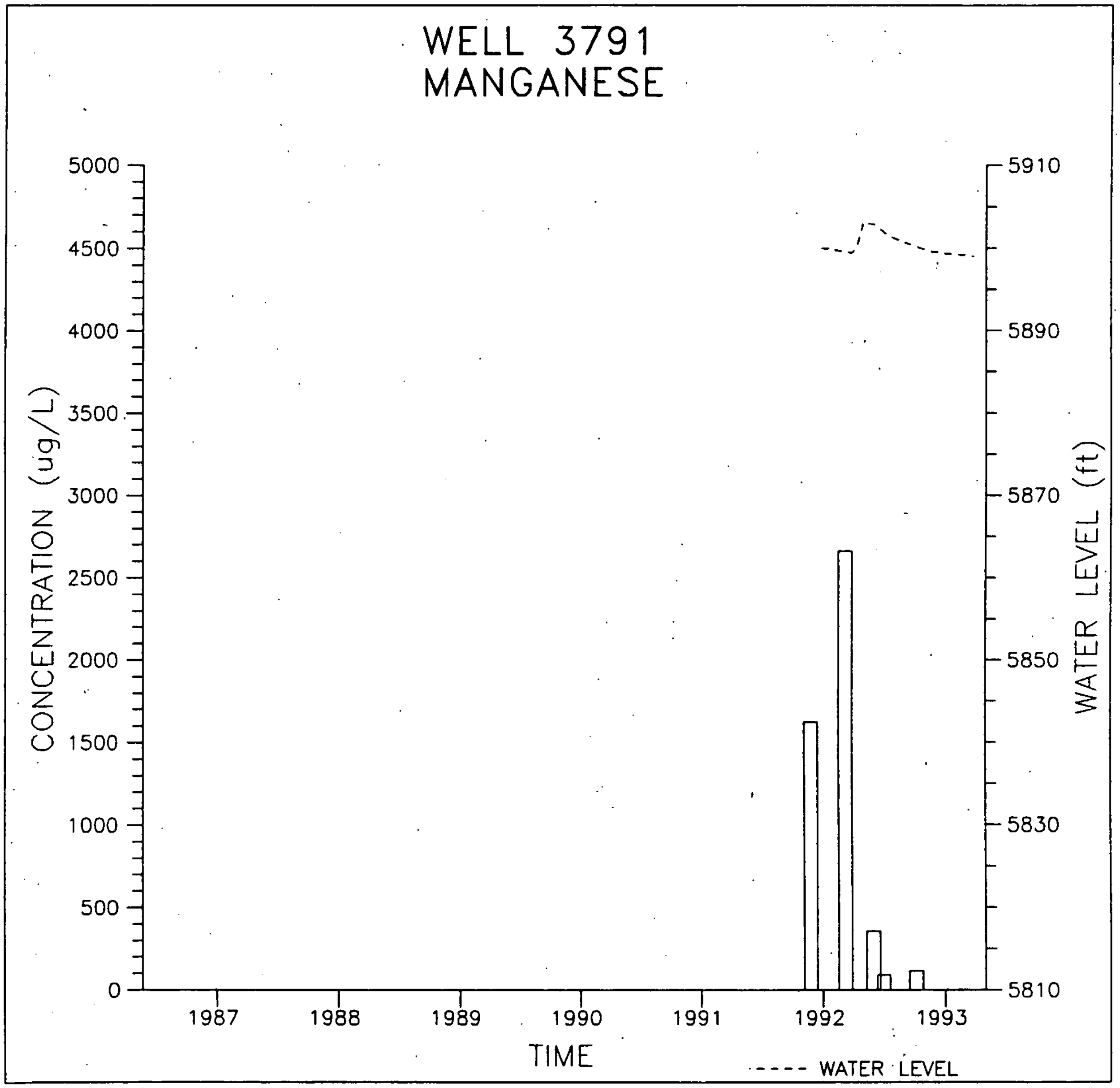
317



WELL 2991
MANGANESE
CONCENTRATION (ug/L)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
WATER LEVEL (ft)
5850
5870
5890
5910
5930
5950
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

318

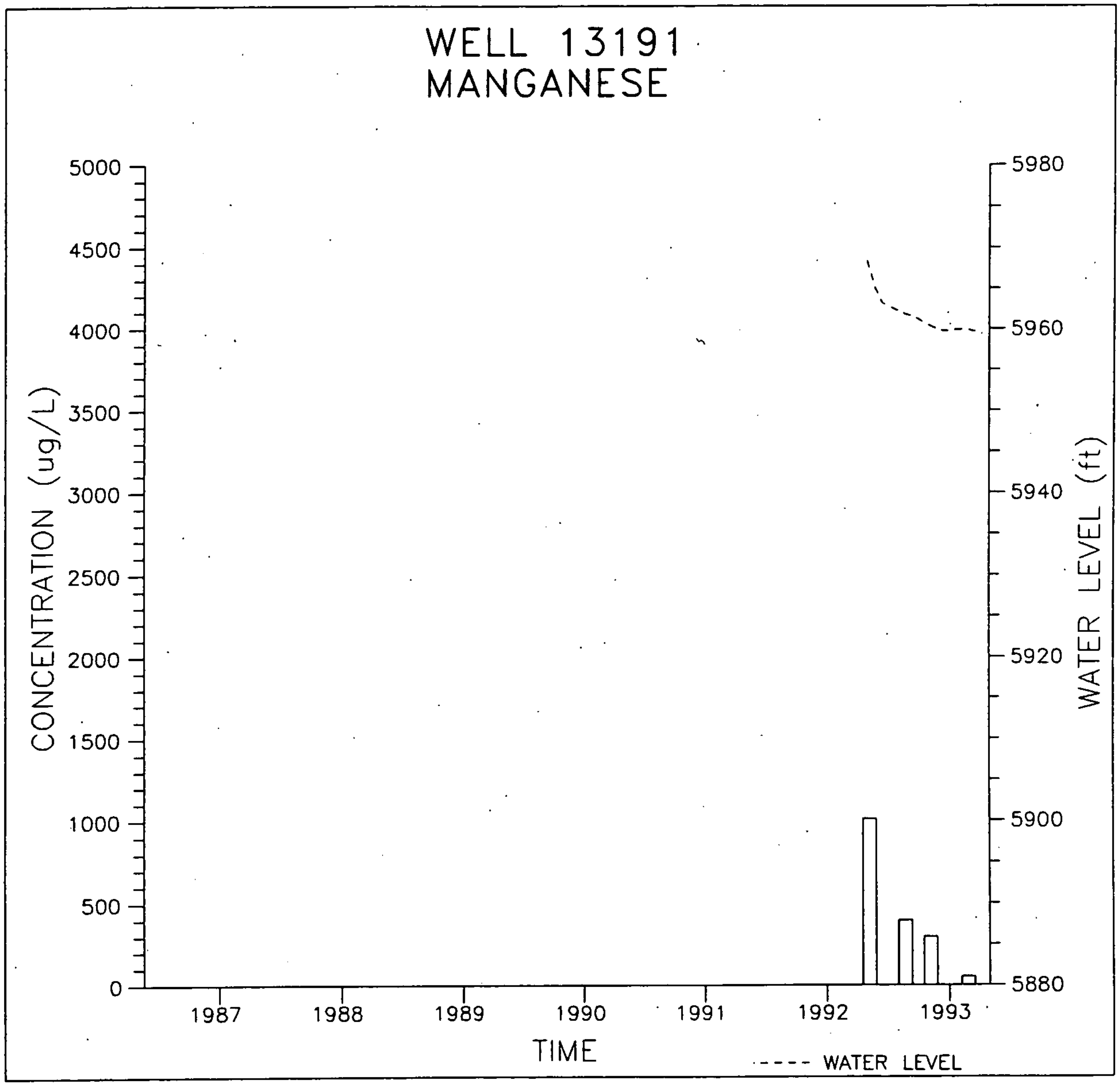
318



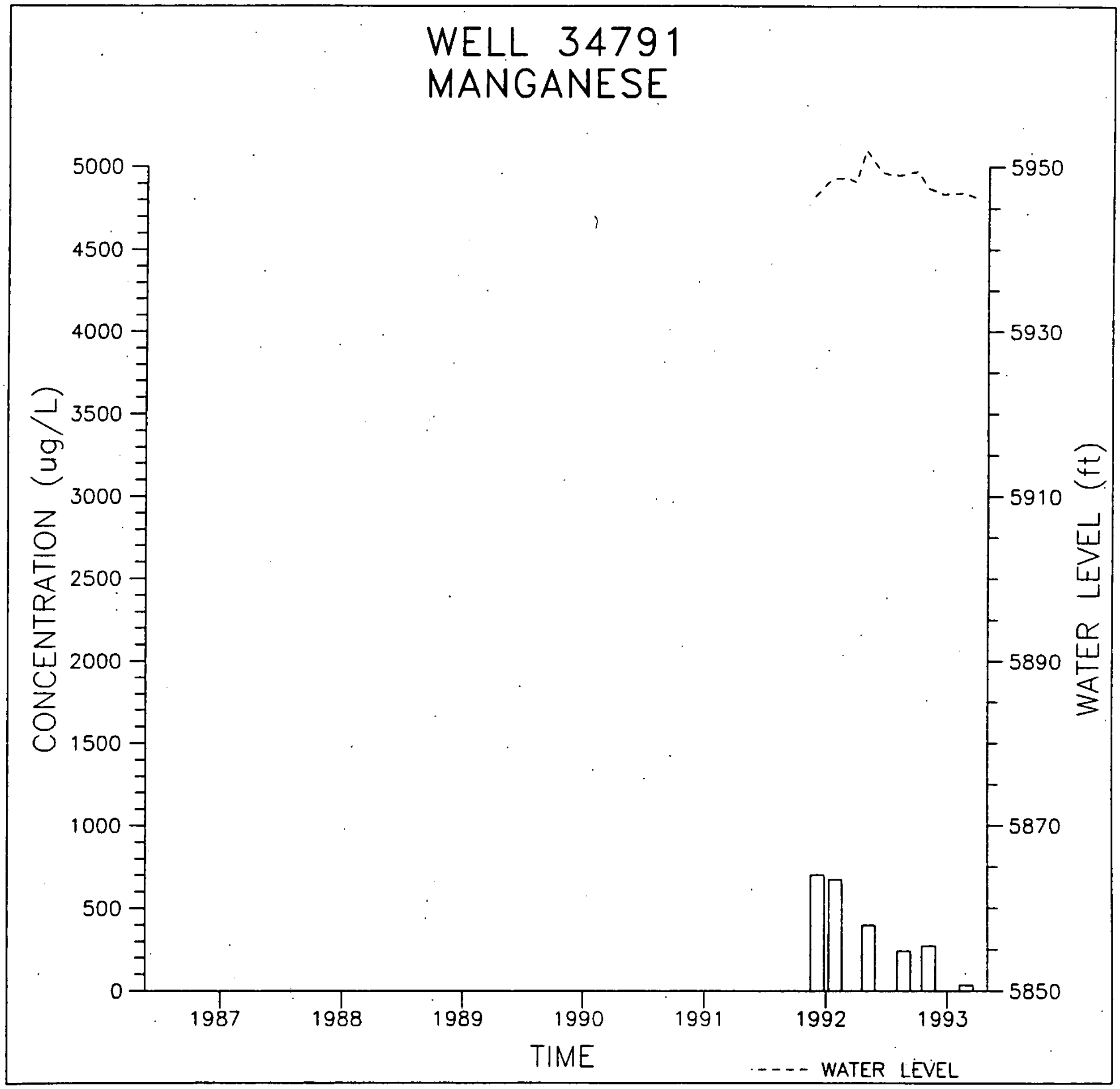
WELL 3791
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

319

319

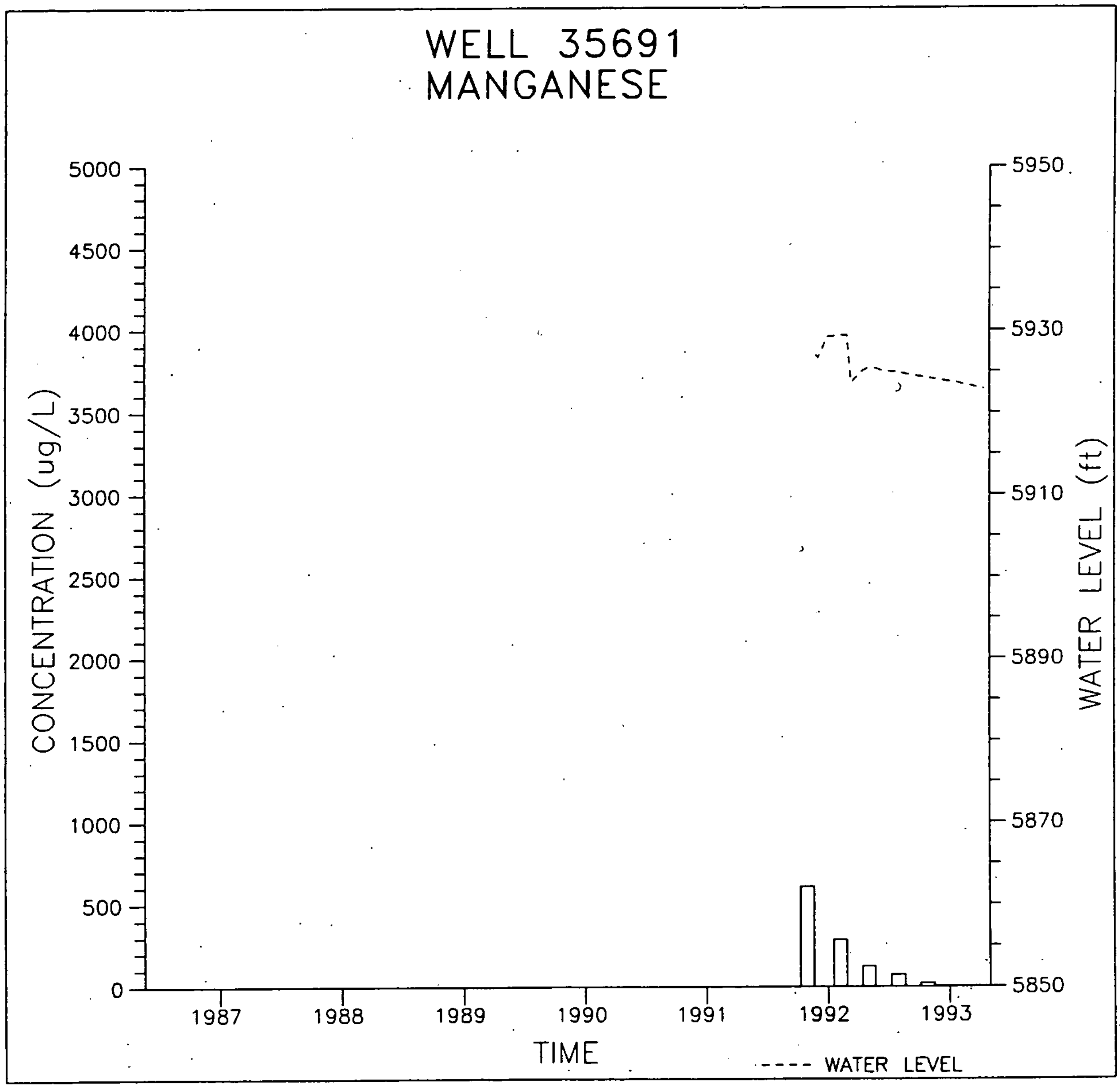


WELL 13191
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

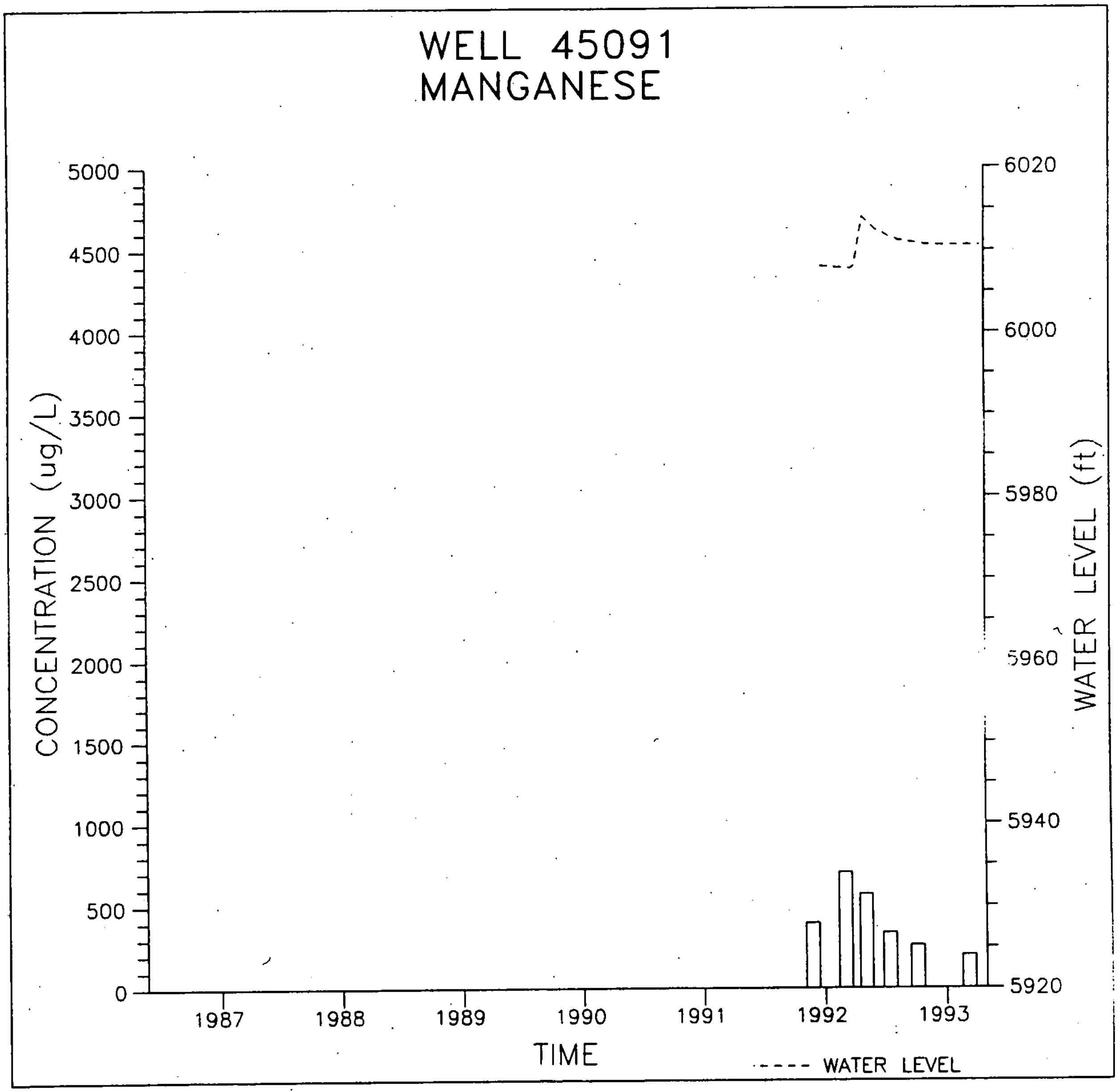

WELL 34791
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

321

321

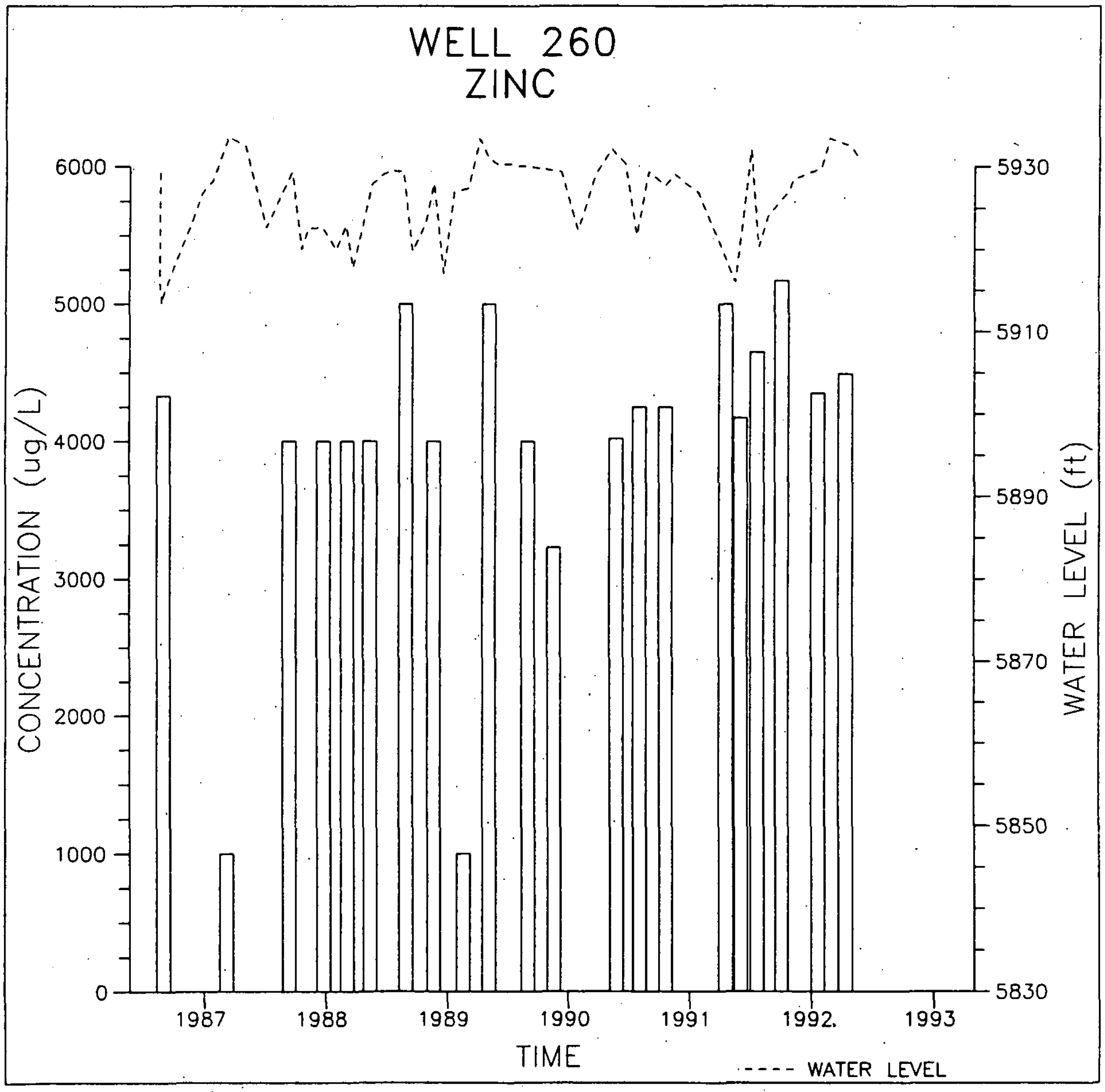


WELL 35691
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL


WELL 45091
MANGANESE
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
6020
6000
5980
5960
5940
5920
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

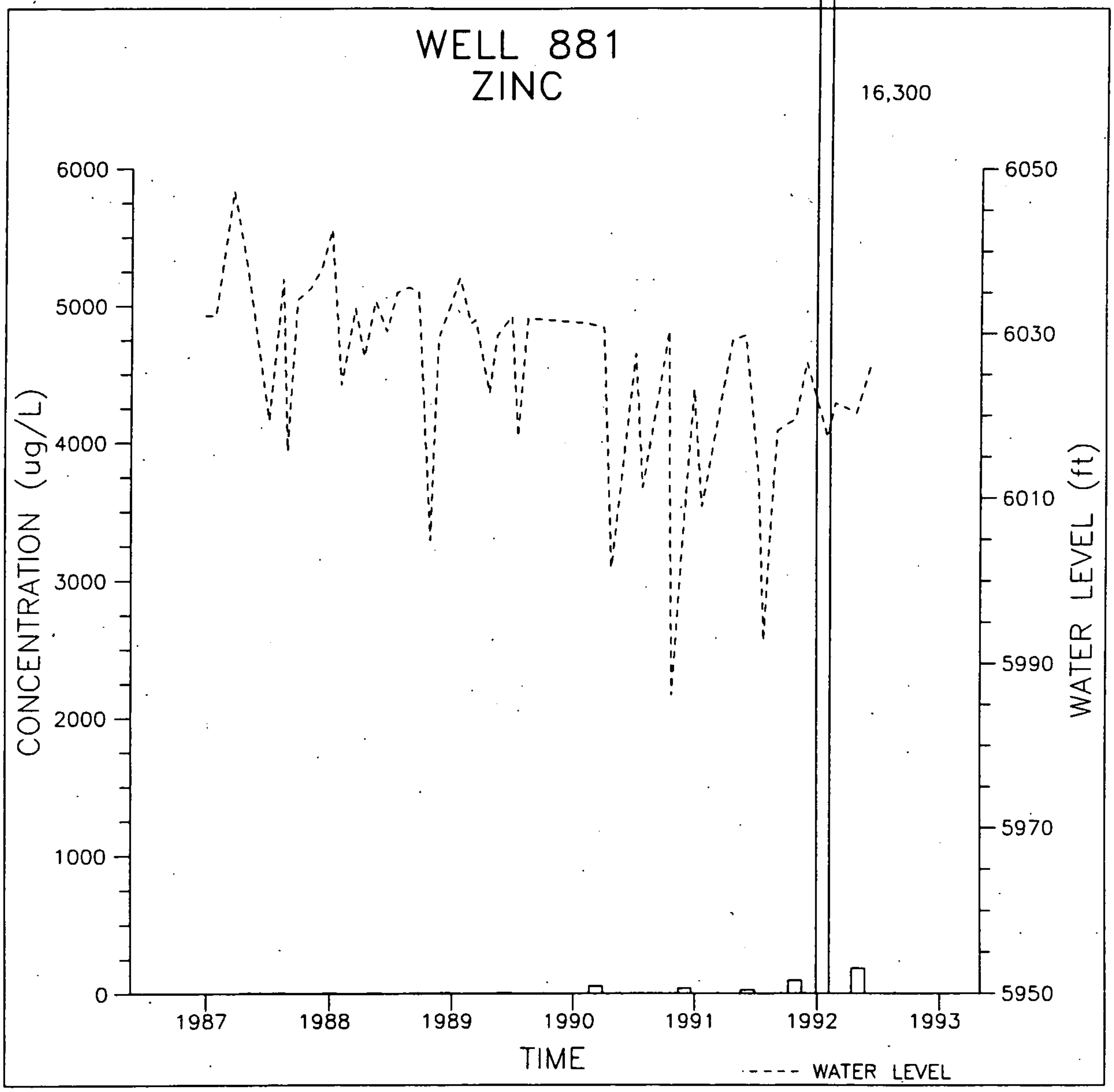
323

~~323~~


WELL 260
ZINC
CONCENTRATION (ug/L)
0
1000
2000
3000
4000
5000
6000
WATER LEVEL (ft)
5830
5850
5870
5890
5910
5930
1987
1988
1989
1990
1991
1992.
1993
TIME
---- WATER LEVEL

324

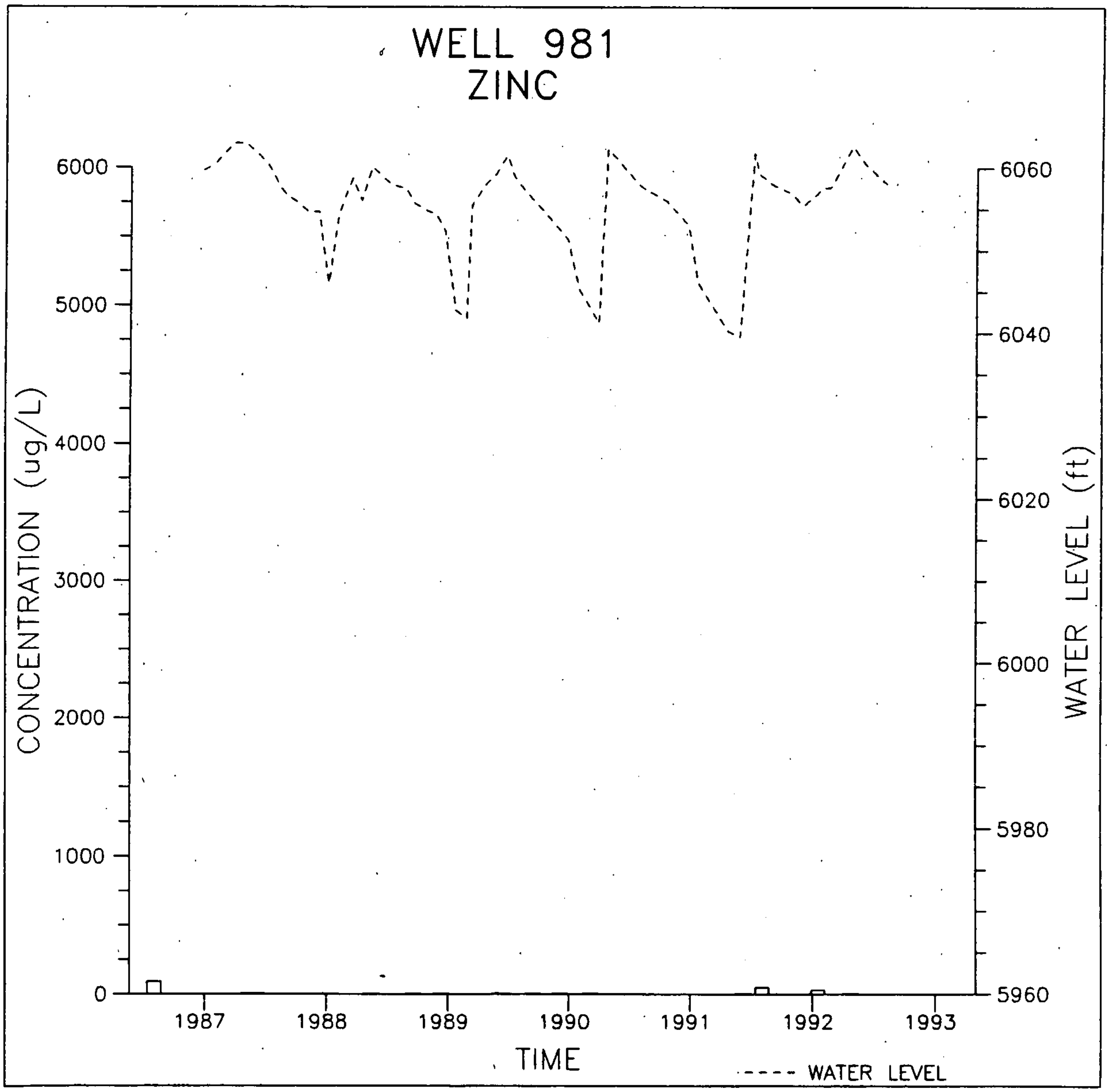
324



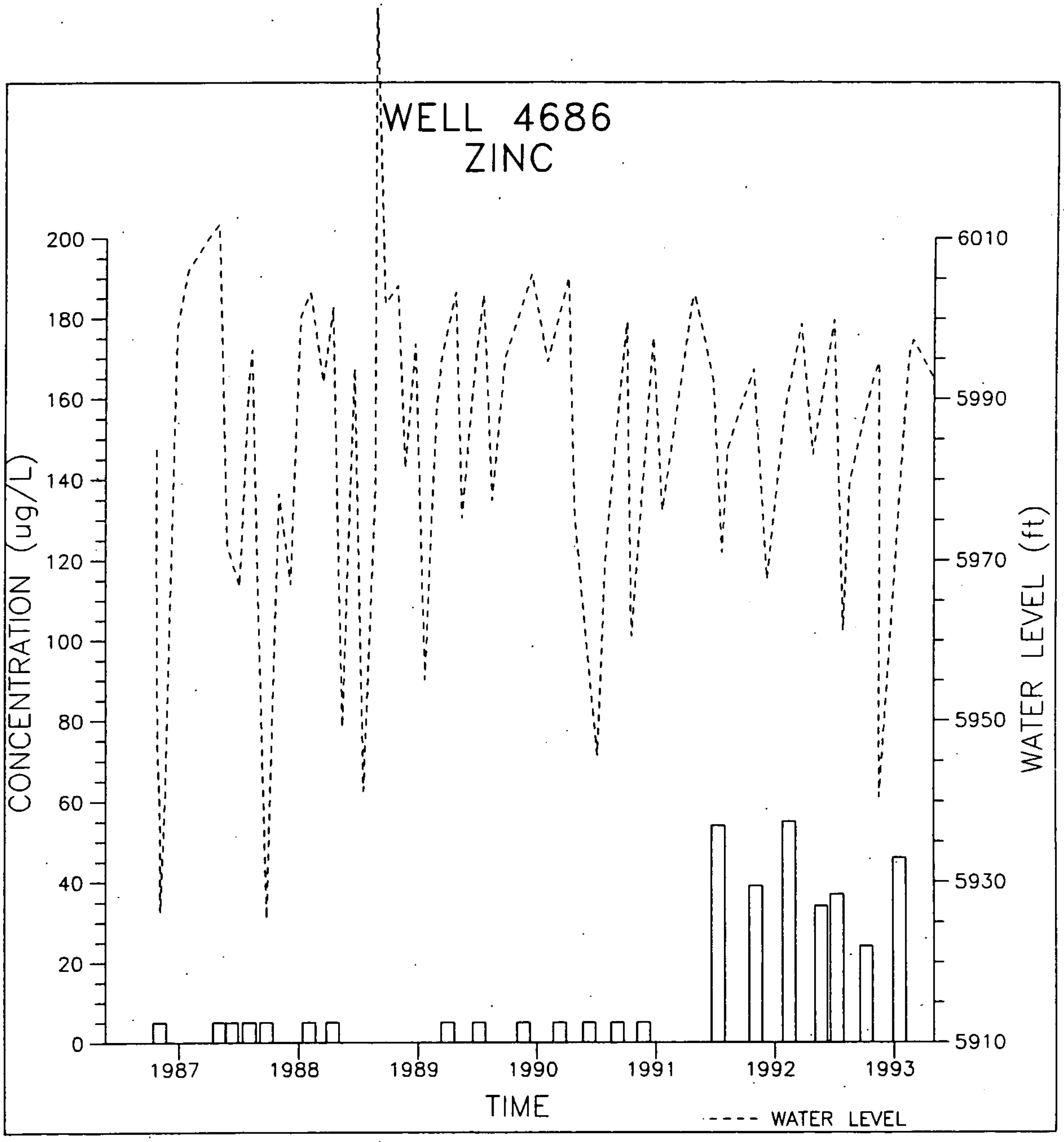
WELL 881
ZINC
16,300
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
6050
6030
6010
5990
5970
5950
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

325

325



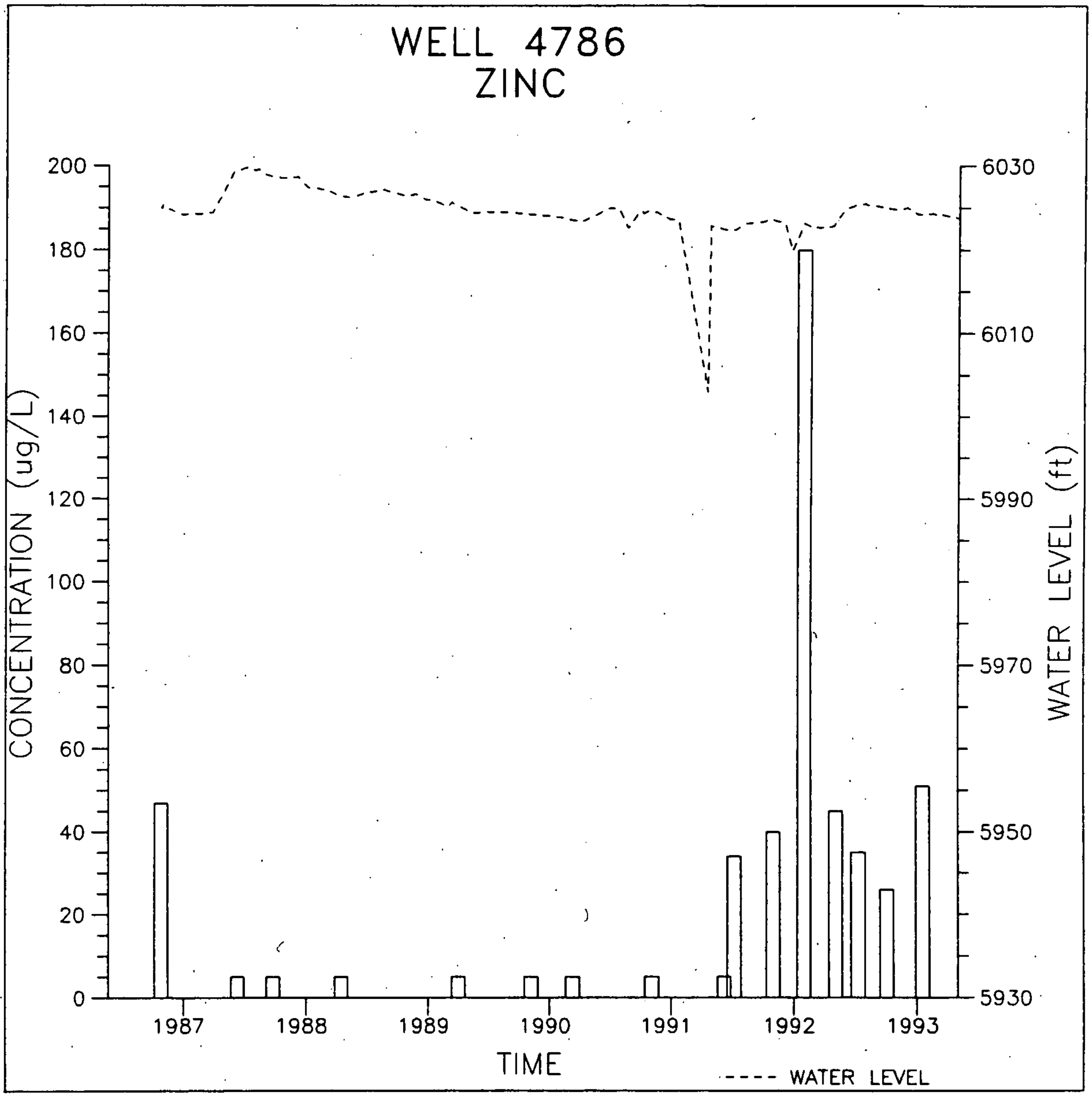
WELL 981
ZINC
CONCENTRATION (ug/L)
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
6060
6040
6020
6000
5980
5960
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



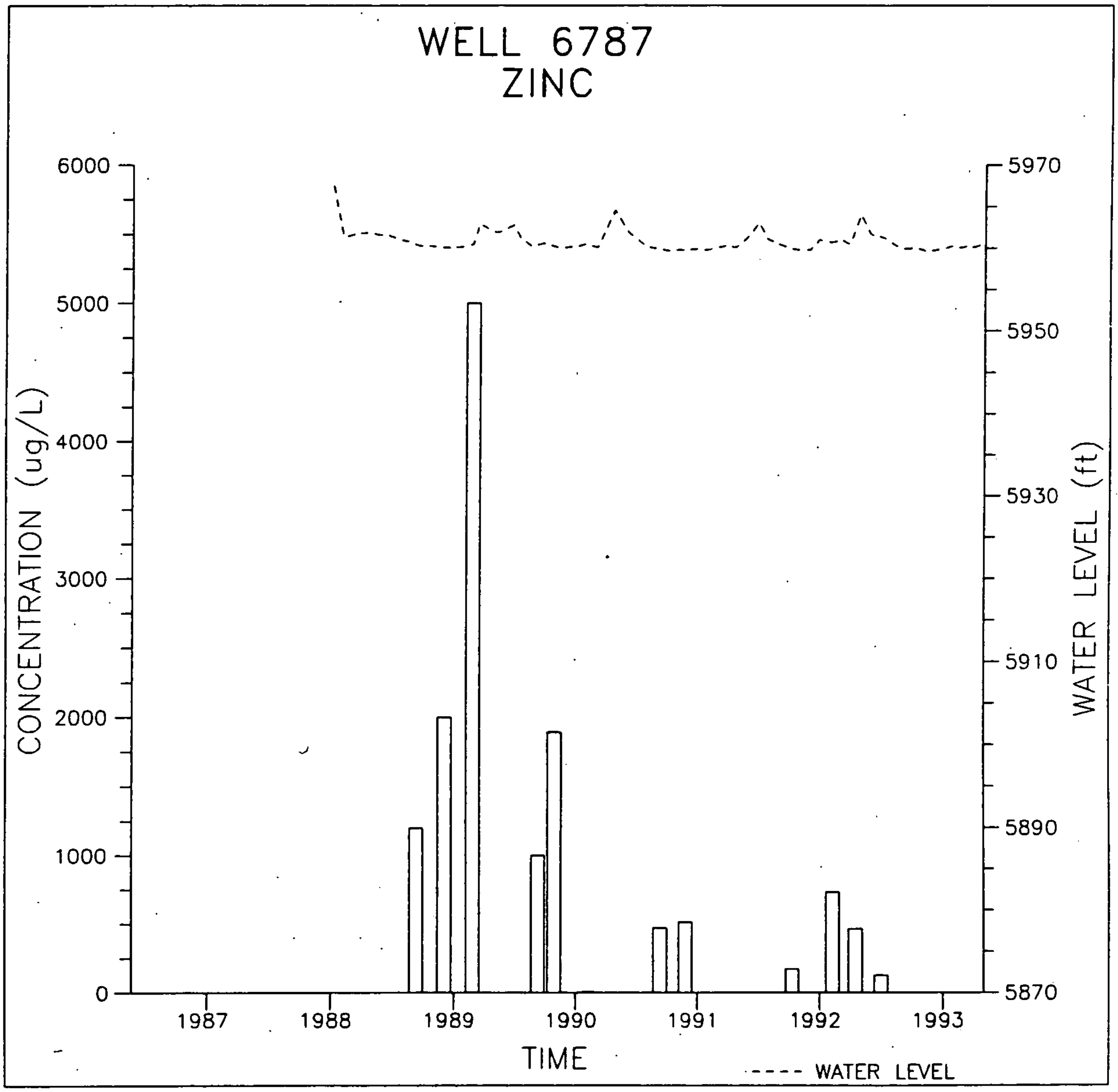
WELL 4686
ZINC
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6010
5990
5970
5950
5930
5910
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

327

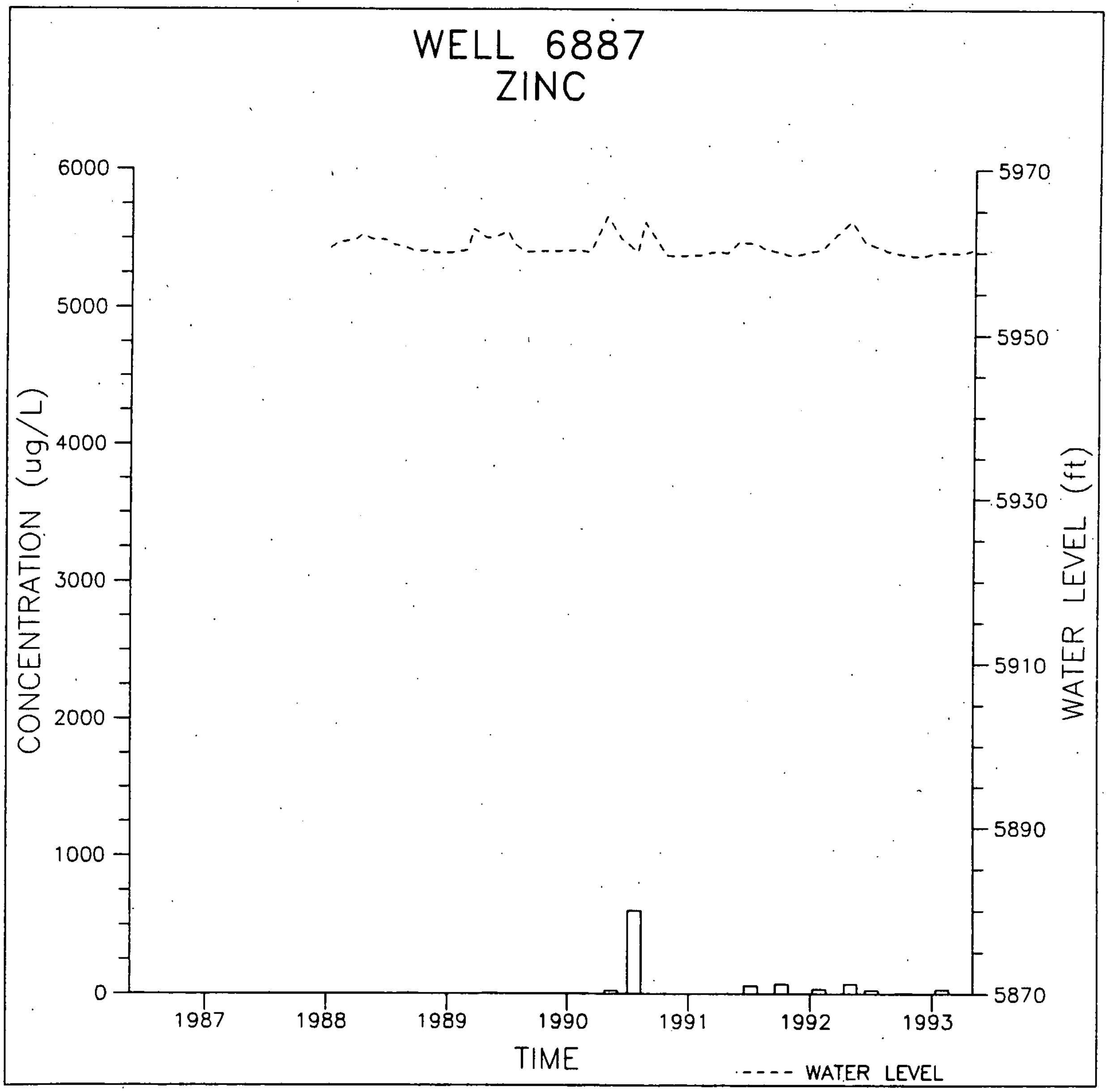
327



WELL 4786
ZINC
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6030
6010
5990
5970
5950
5930
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

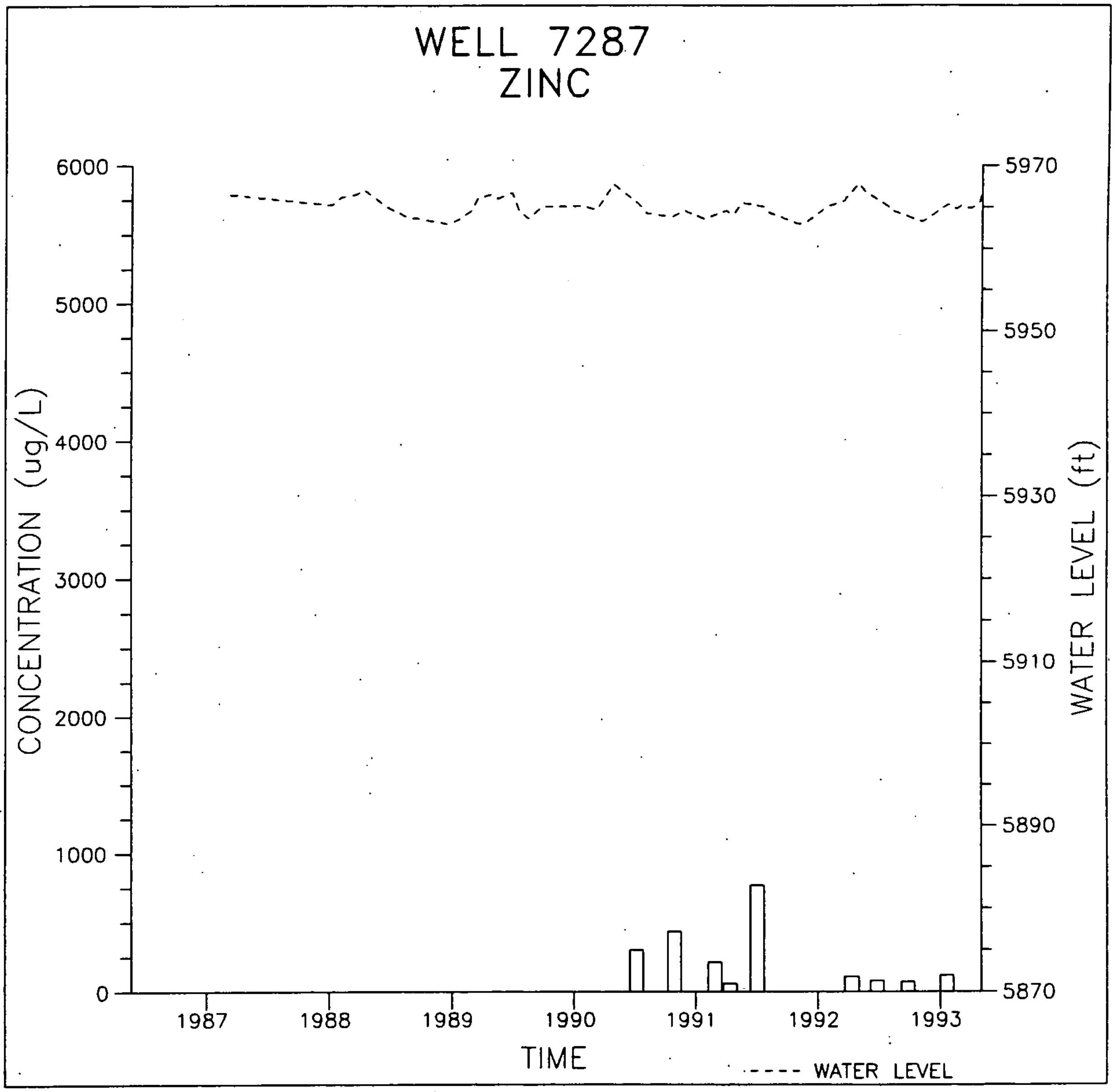

WELL 6787
ZINC
CONCENTRATION (ug/L)
0
1000
2000
3000
4000
5000
6000
WATER LEVEL (ft)
5870
5890
5910
5930
5950
5970
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

329

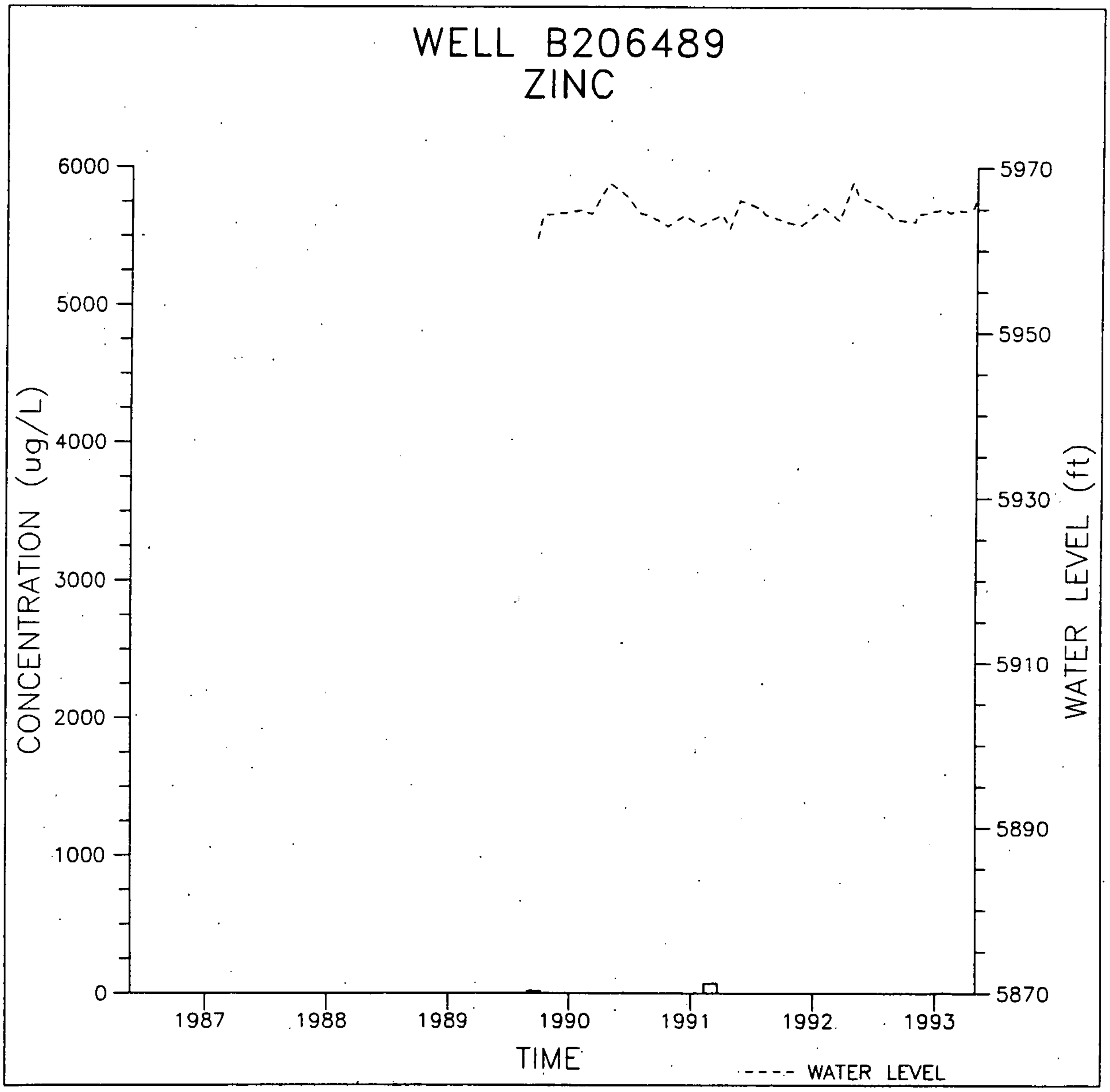


WELL 6887
ZINC
CONCENTRATION (ug/L)
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

330

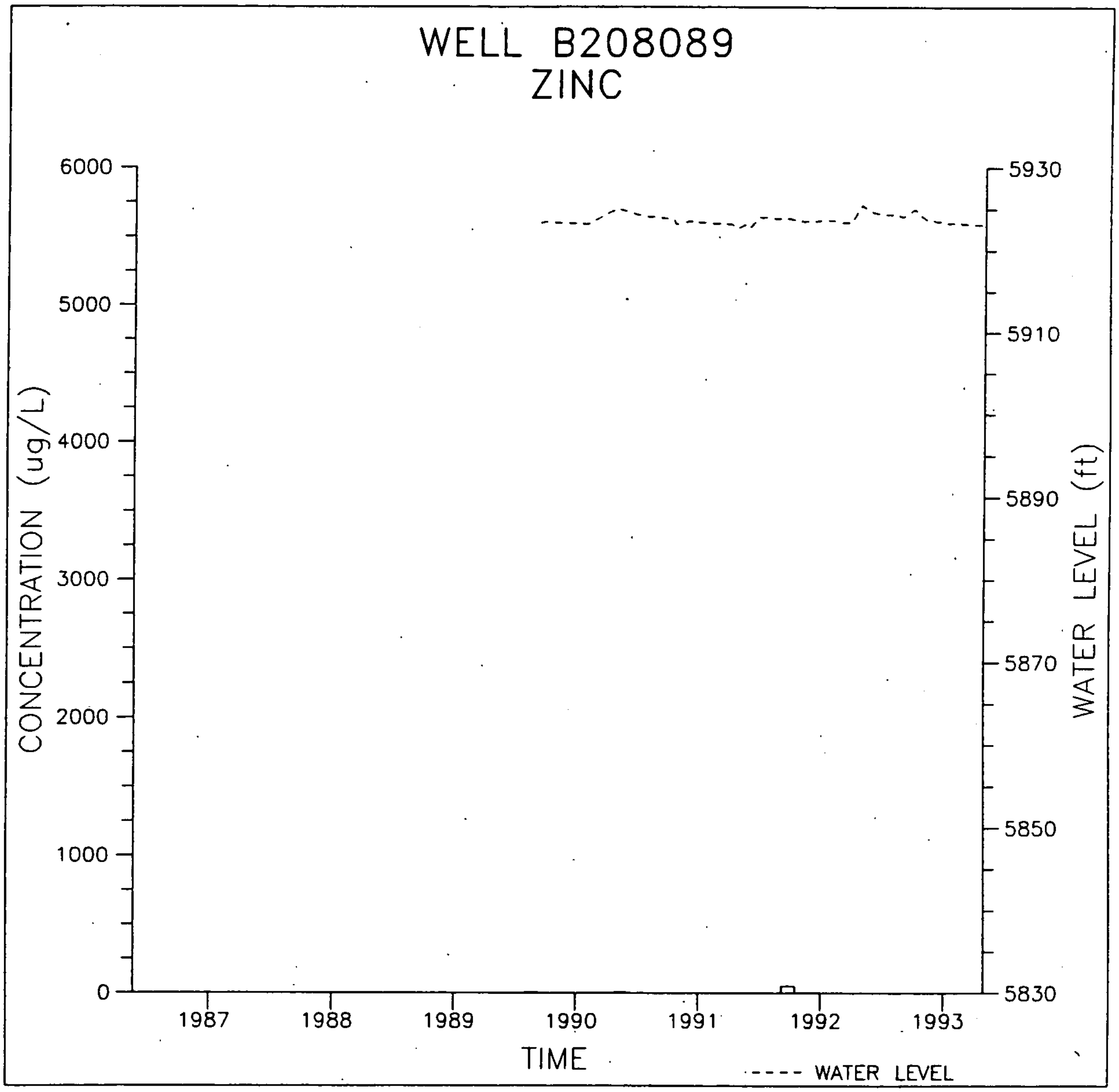

WELL 7287
ZINC
CONCENTRATION (ug/L)
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

331



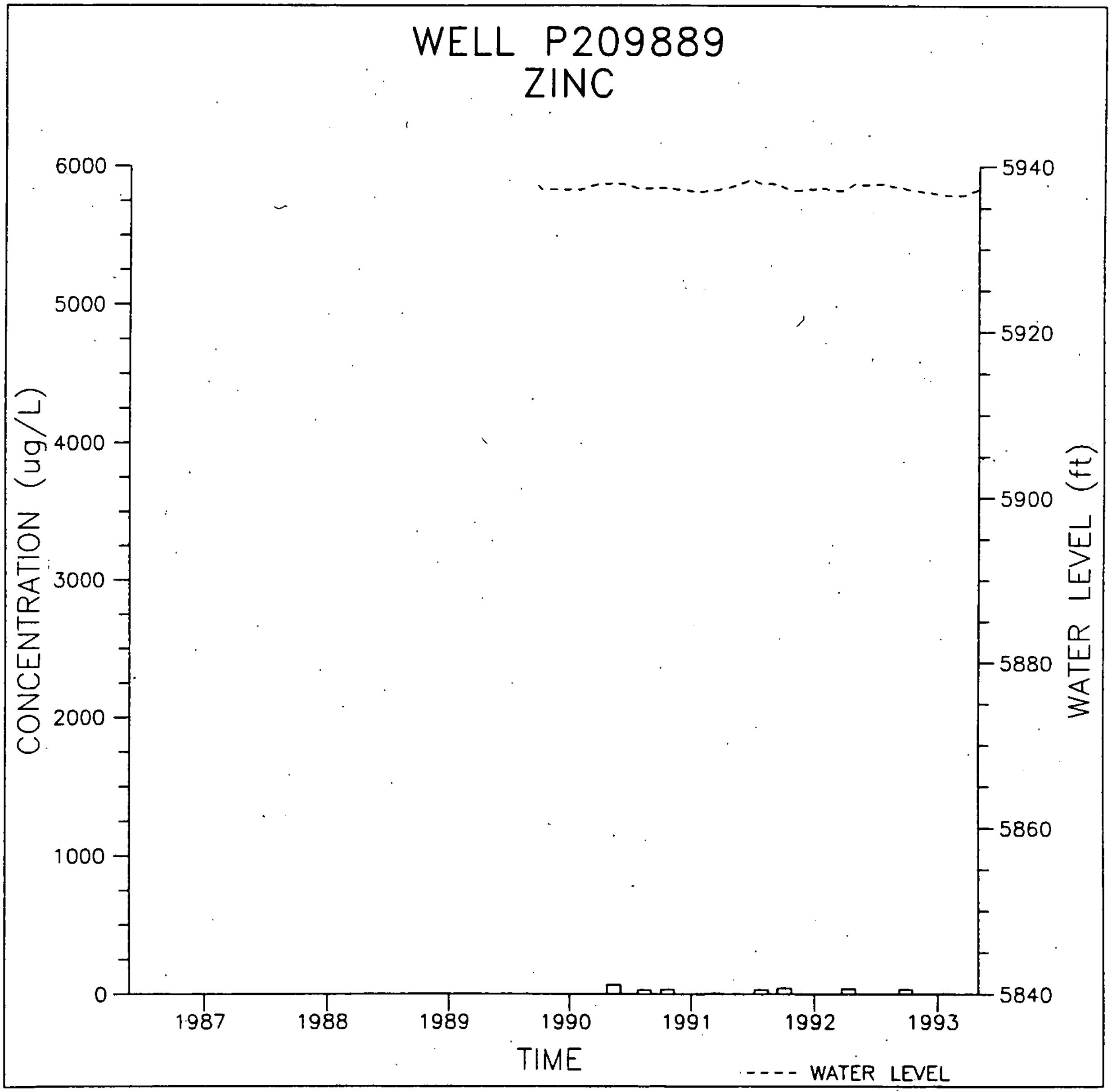
WELL B206489
ZINC
CONCENTRATION (ug/L)
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

332

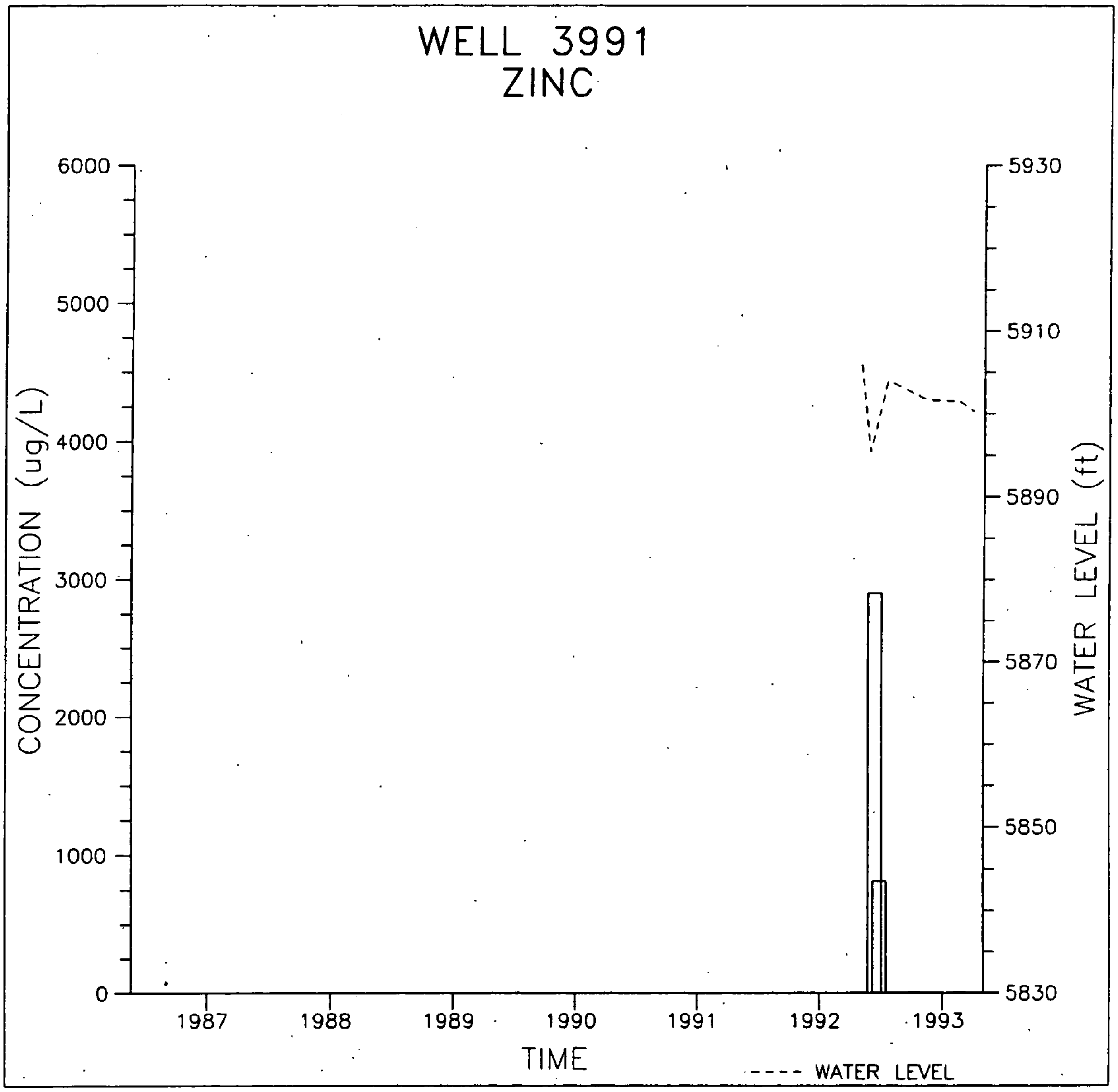


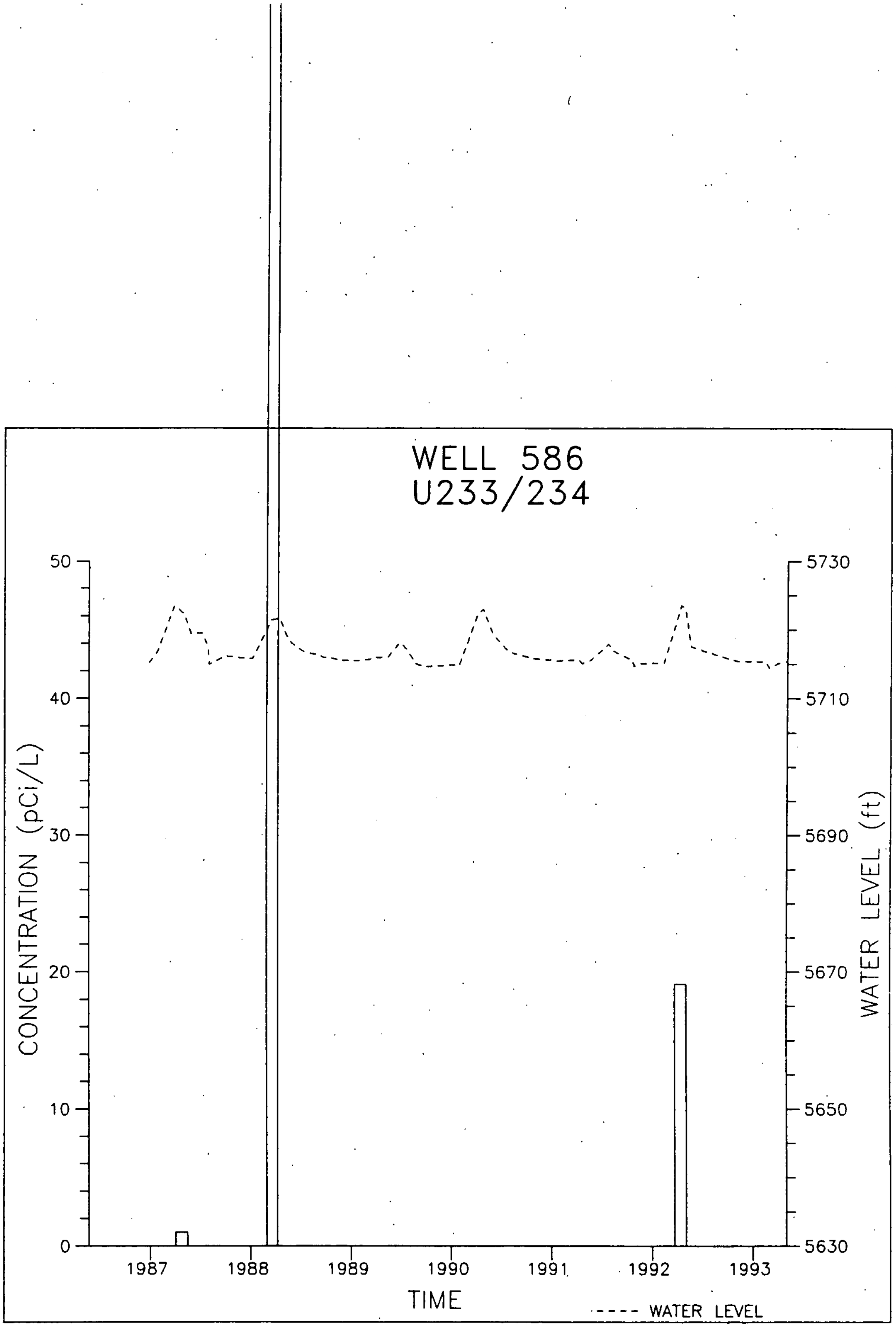
WELL B208089
ZINC
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

333


WELL P209889
ZINC
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

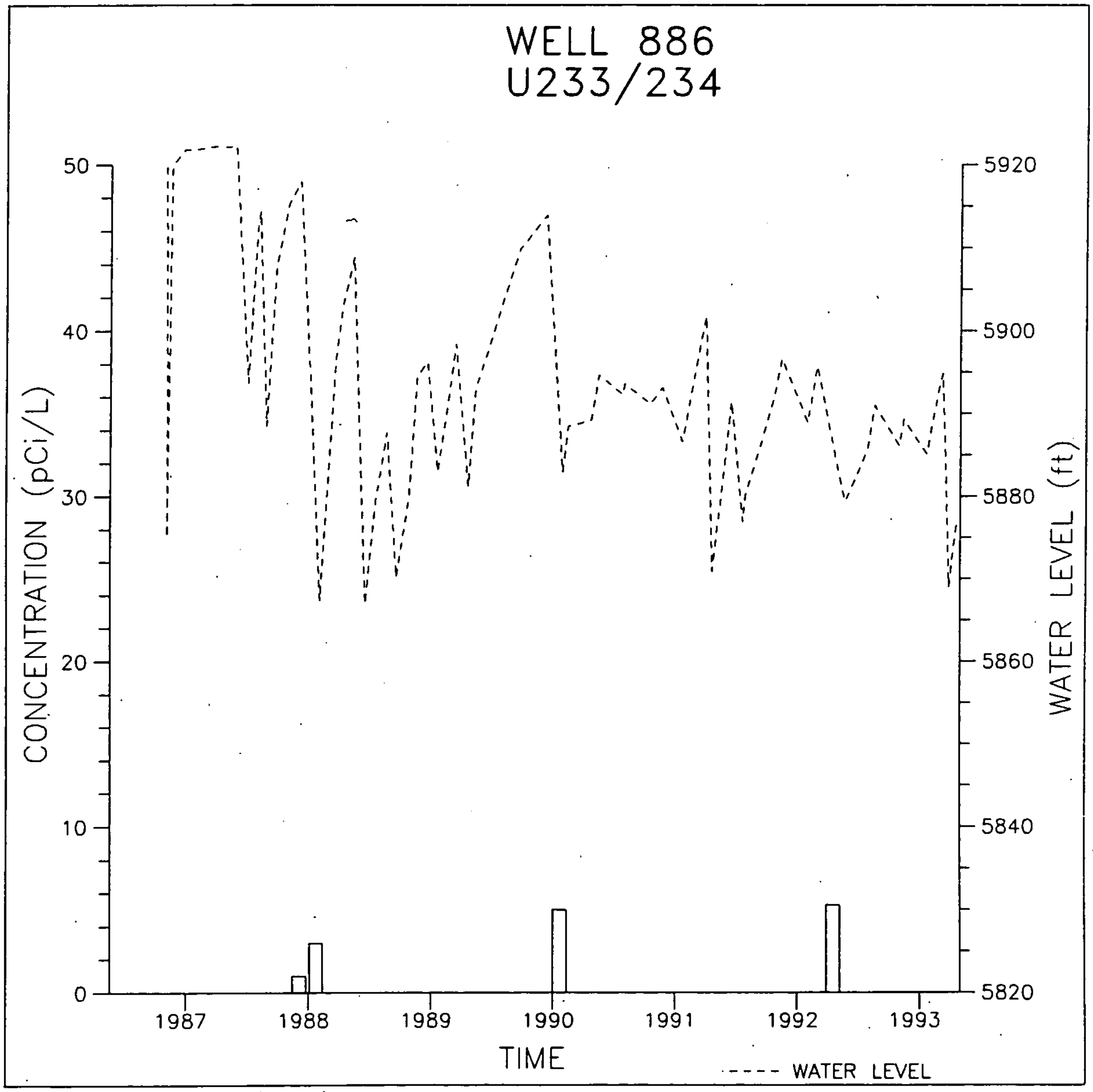
334


WELL 3991
ZINC
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

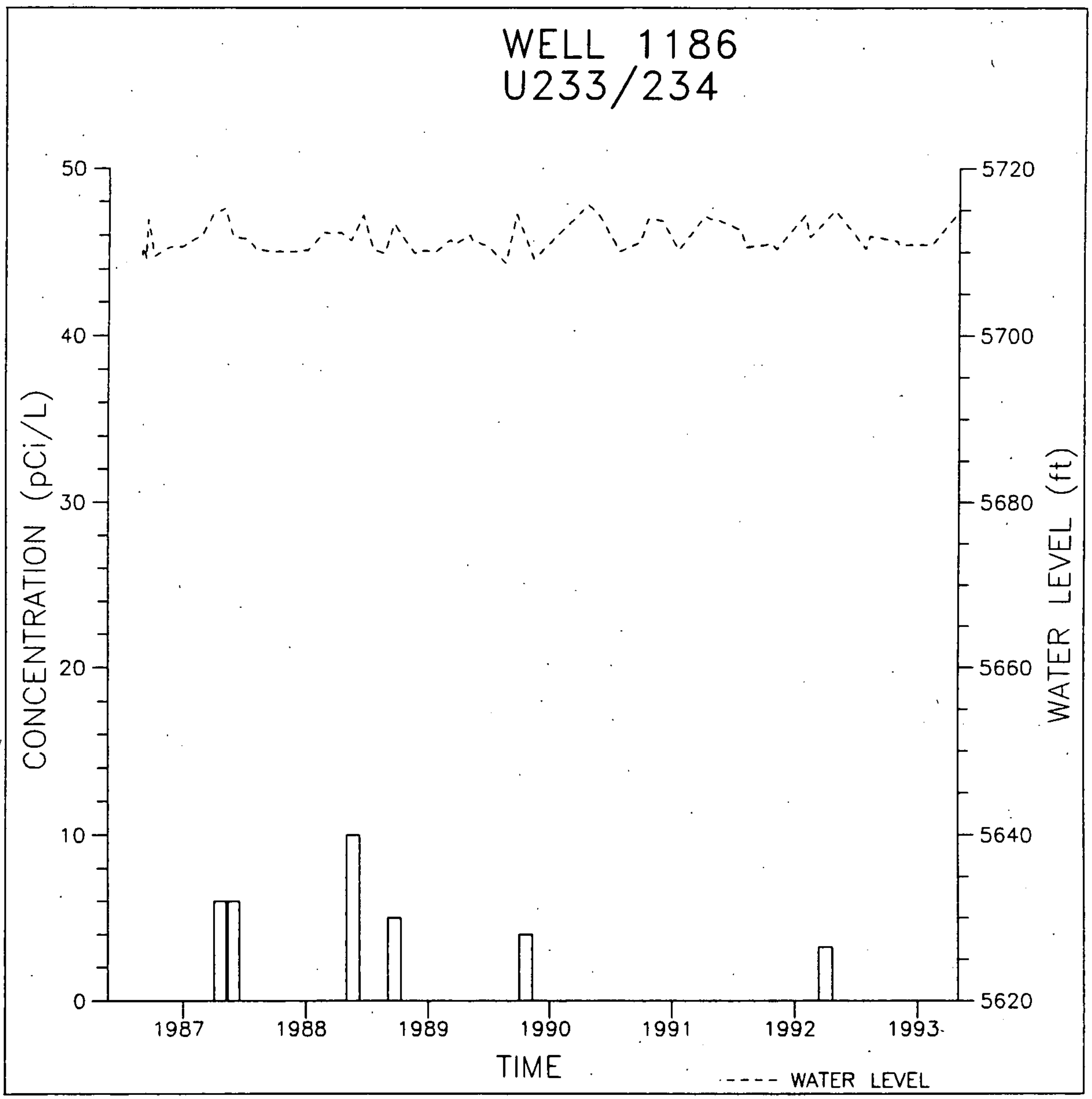

WELL 586
U233/234
CONCENTRATION (pCi/L)
50
40
30
20
10
0
WATER LEVEL (ft)
5730
5710
5690
5670
5650
5630
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

336

336


WELL 886
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

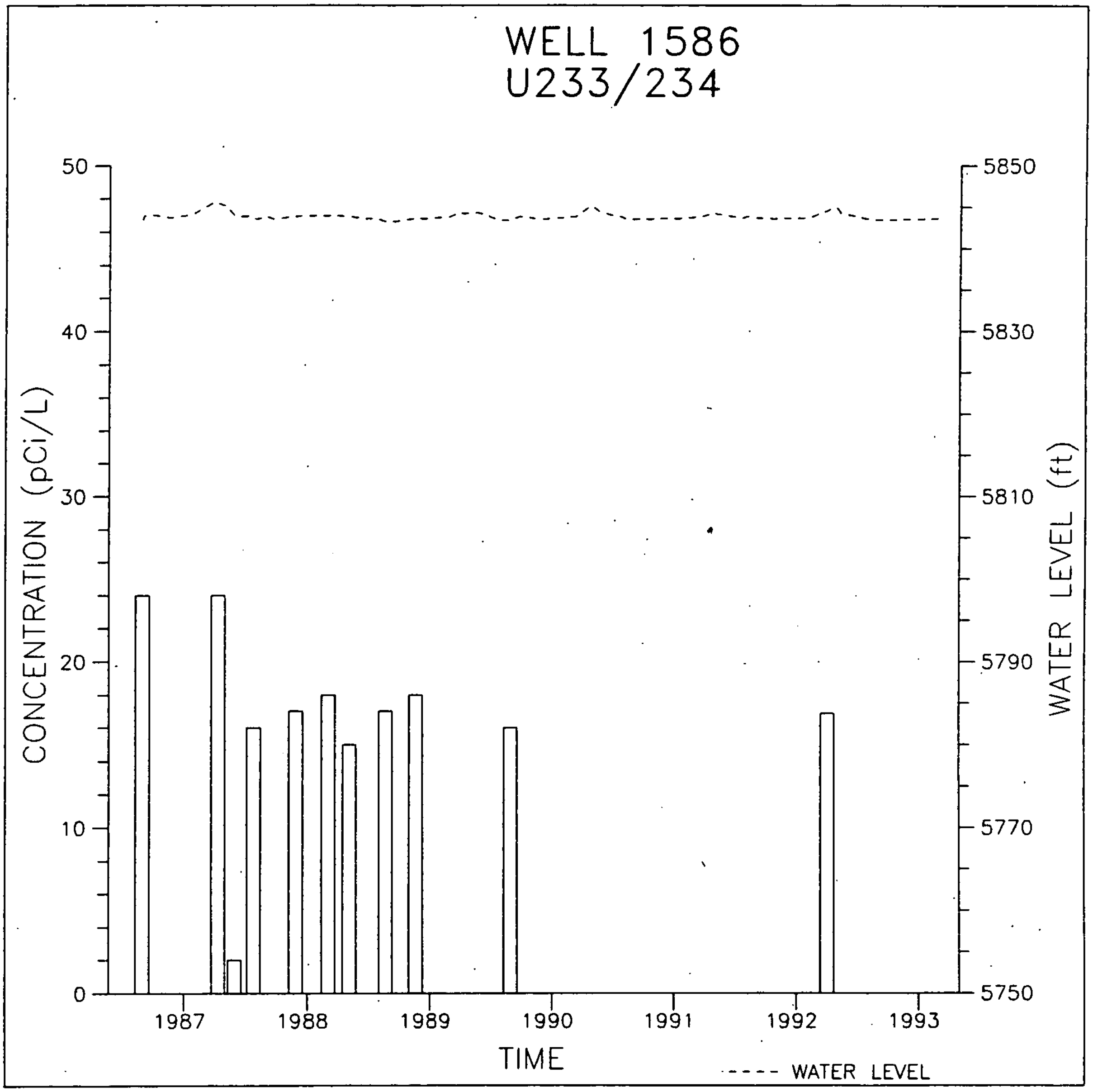
337



WELL 1186
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5720
5700
5680
5660
5640
5620
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

338

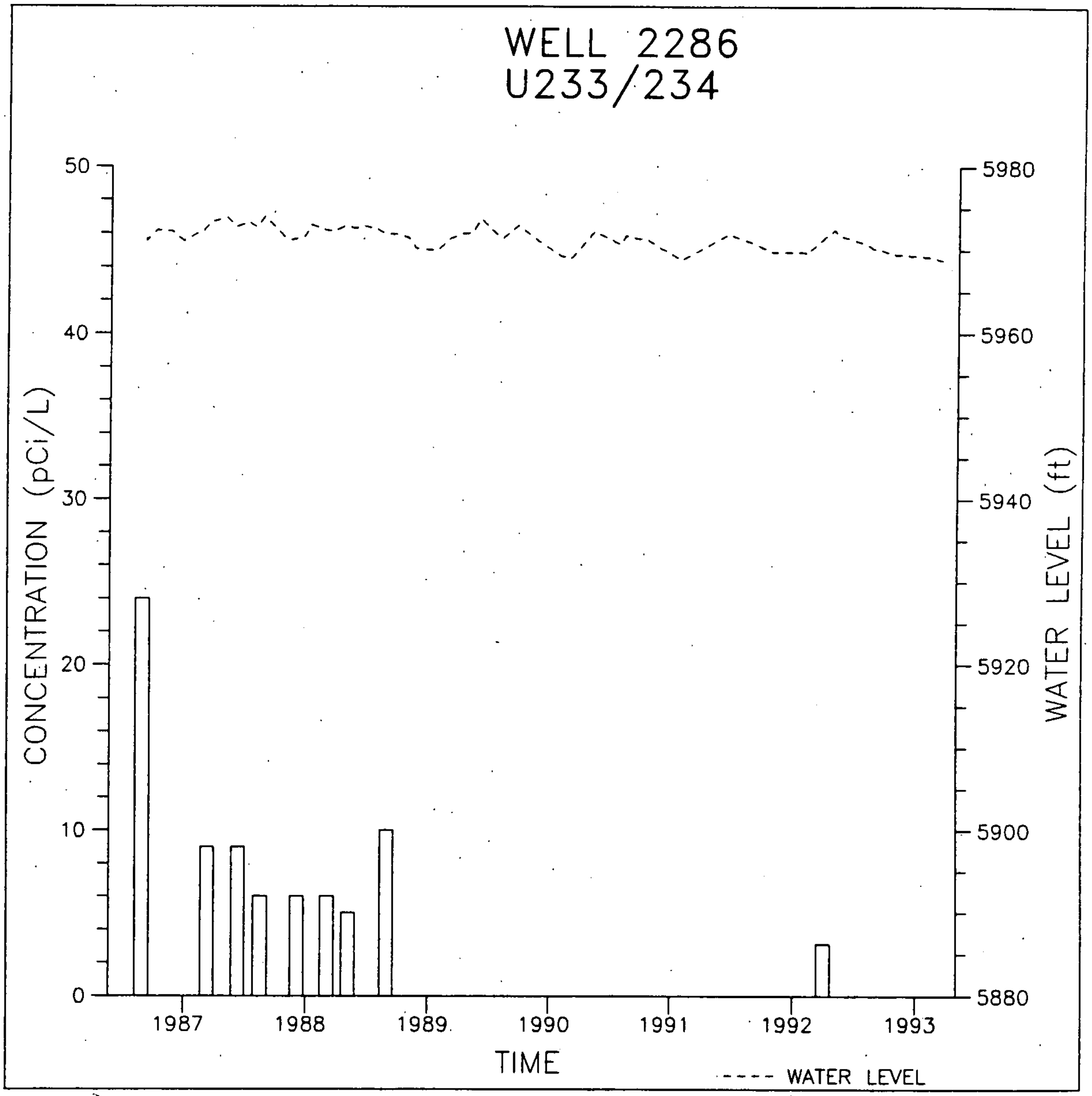
~~338~~



WELL 1586
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
0
10
20
30
40
50
5750
5770
5790
5810
5830
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

339

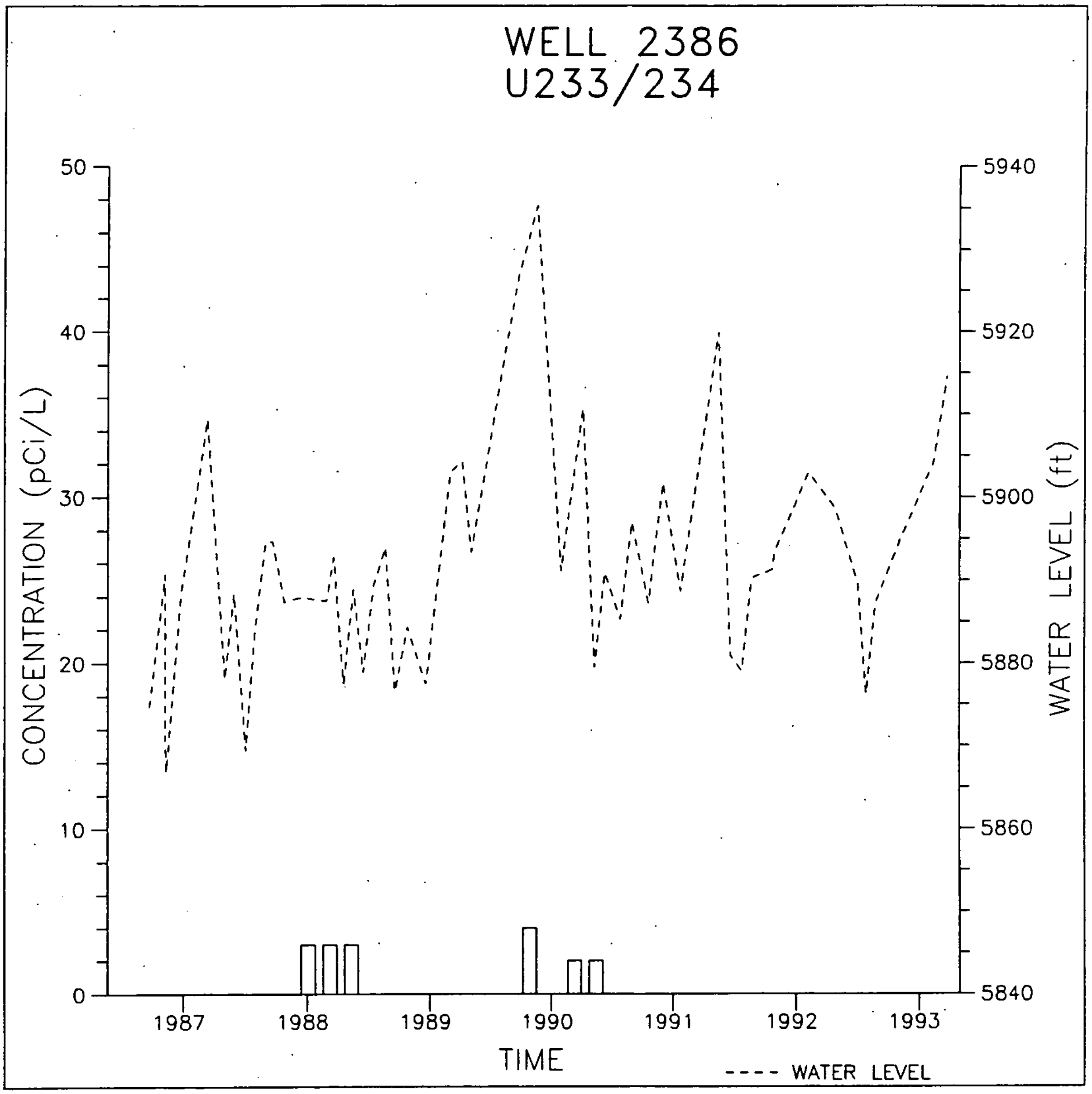
339



WELL 2286
U233/234
CONCENTRATION (pCi/L)
0
10
20
30
40
50
WATER LEVEL (ft)
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

340

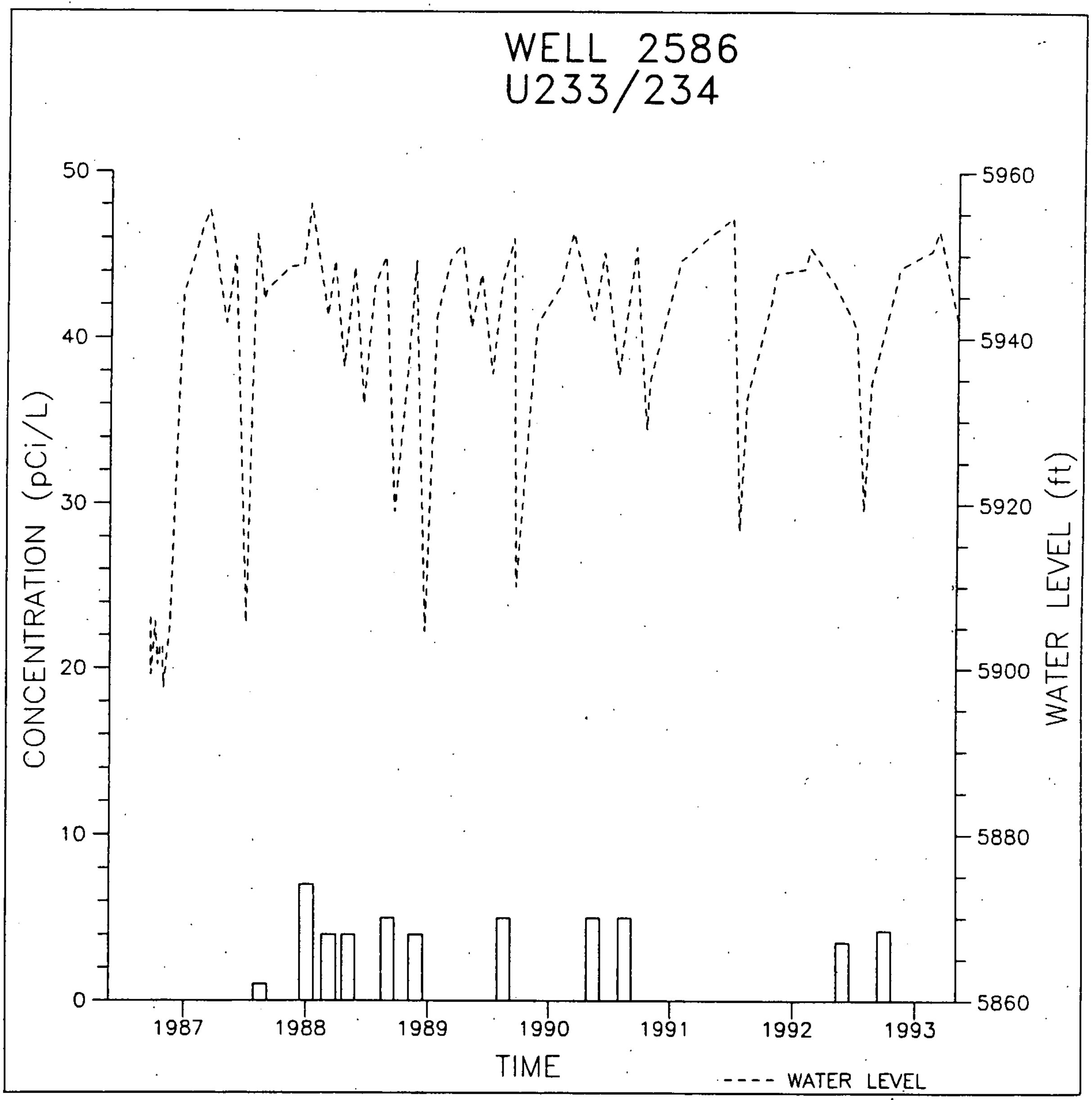
340



WELL 2386
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

341

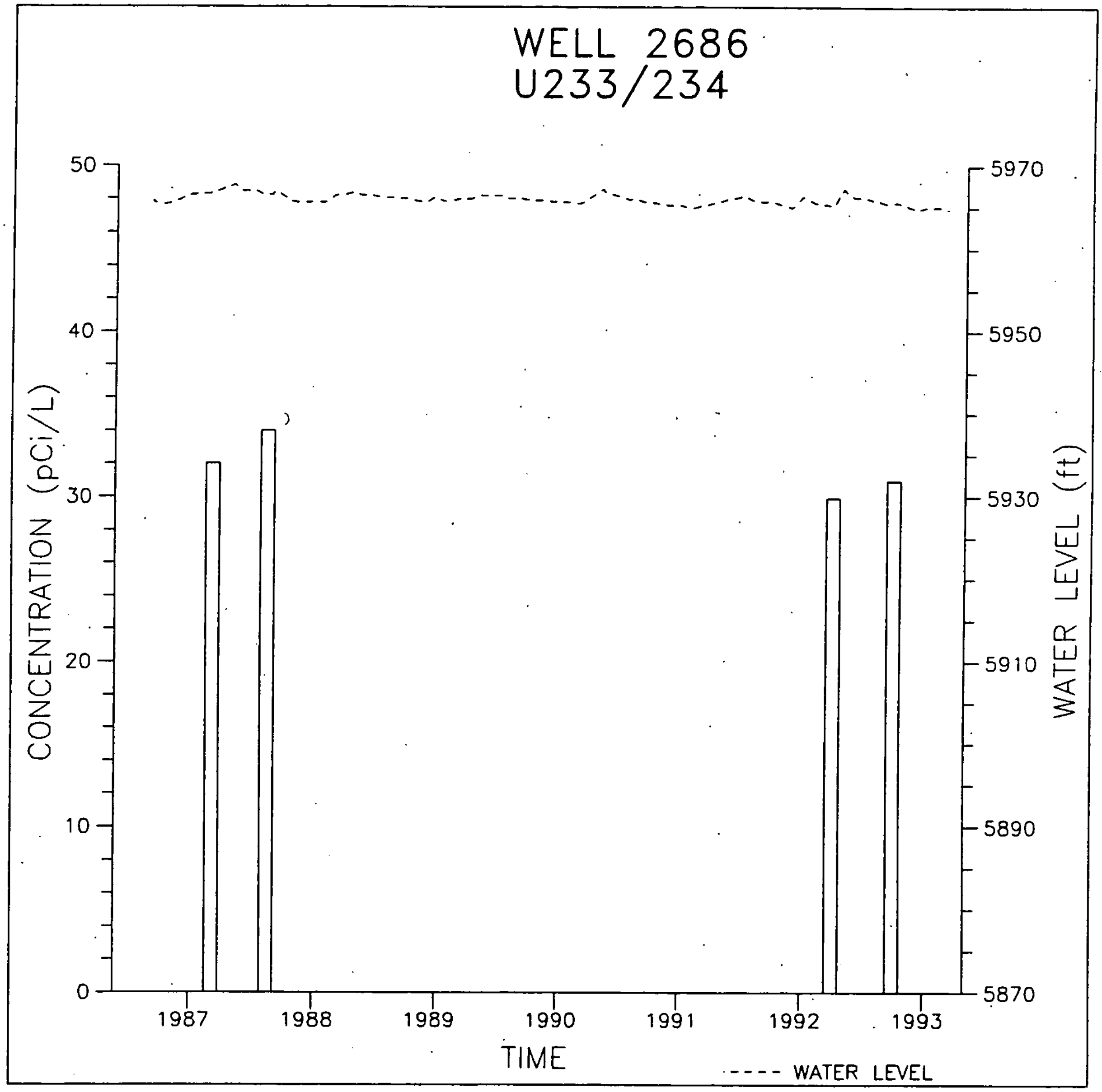
341



WELL 2586
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
10
20
30
40
50
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993

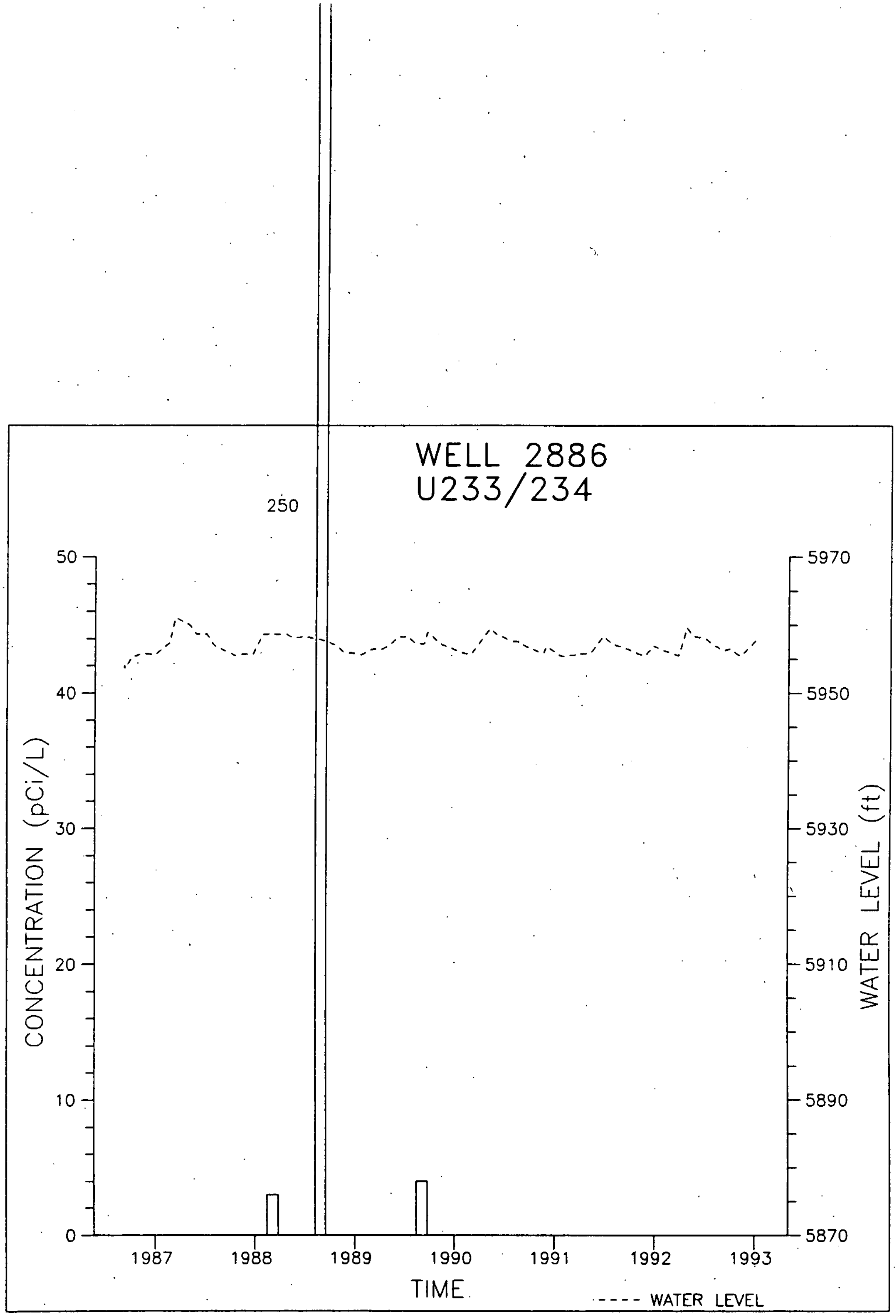
342

342



WELL 2686
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
TIME
WATER LEVEL

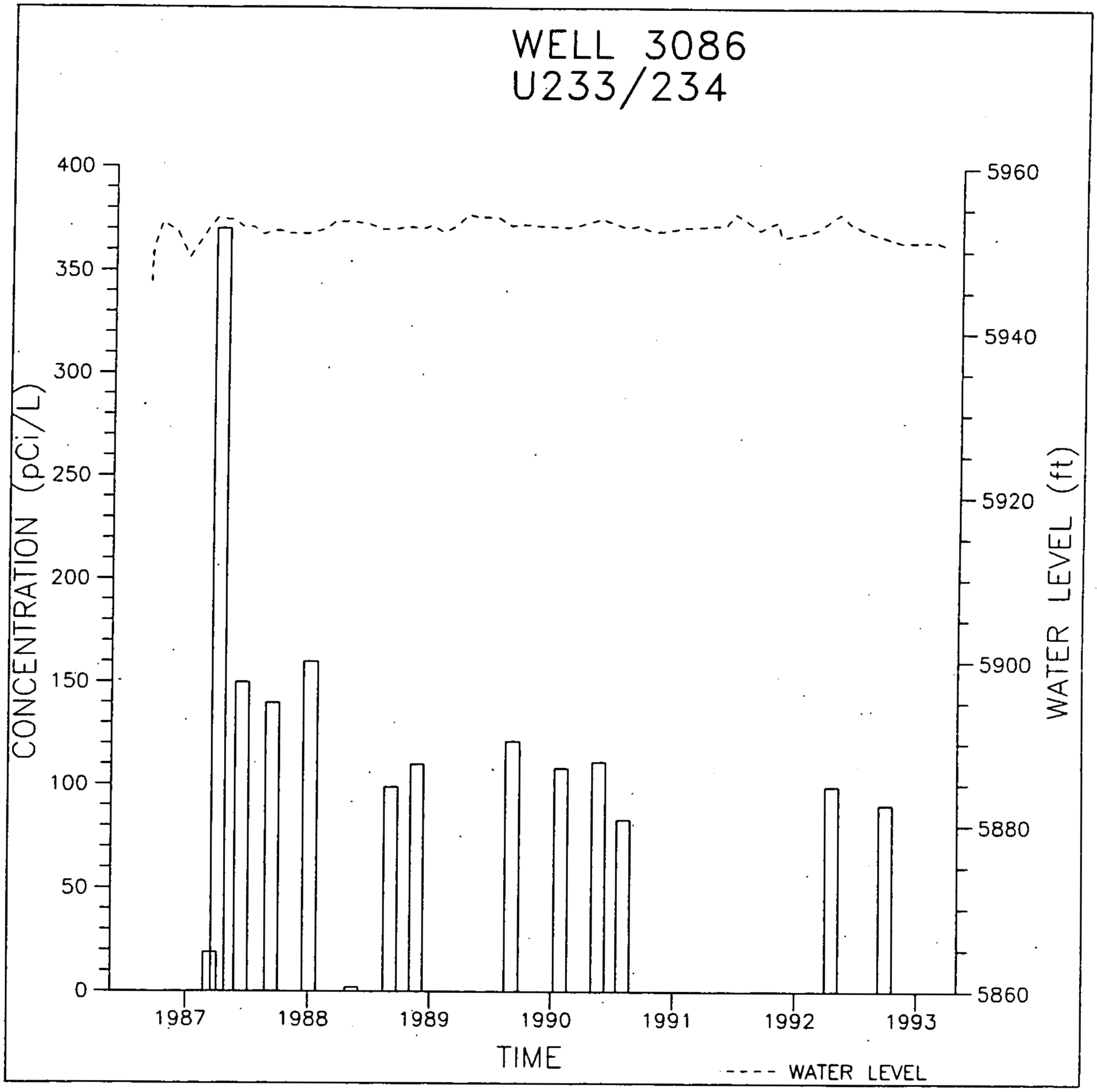
343



WELL 2886
U233/234
250
CONCENTRATION (pCi/L)
50
40
30
20
10
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

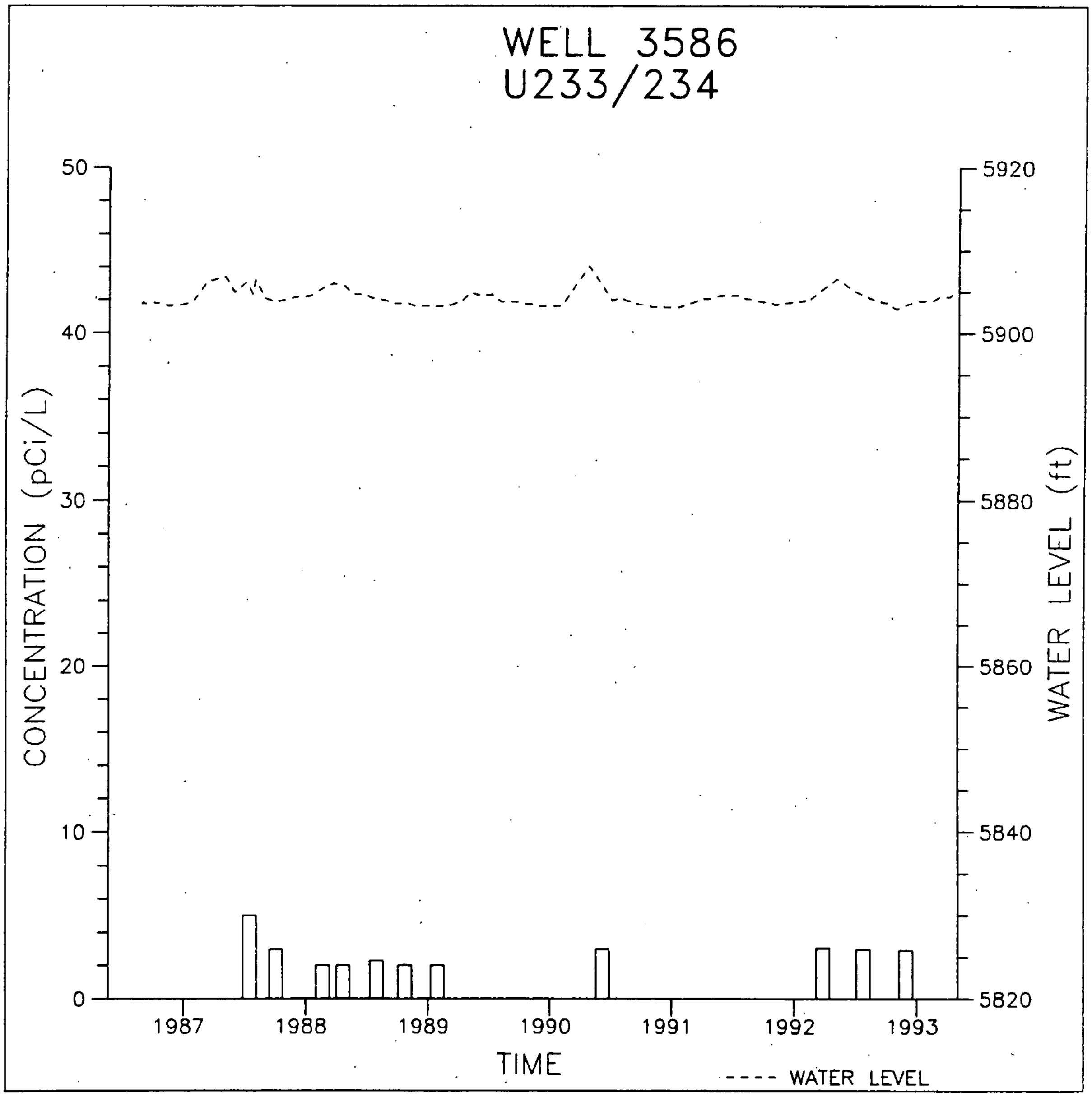
344

344



WELL 3086
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
400
350
300
250
200
150
100
50
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

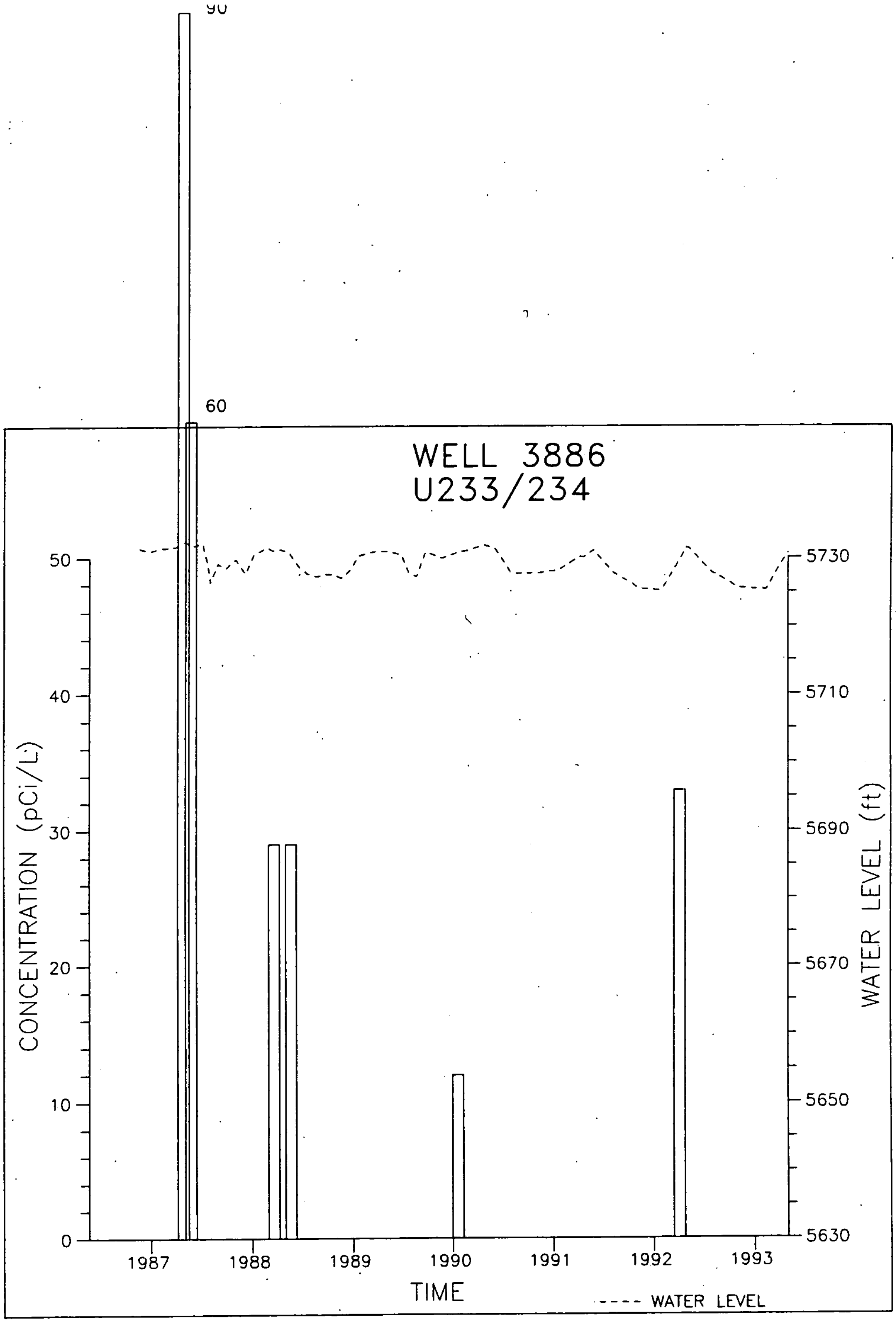
345



WELL 3586
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

346

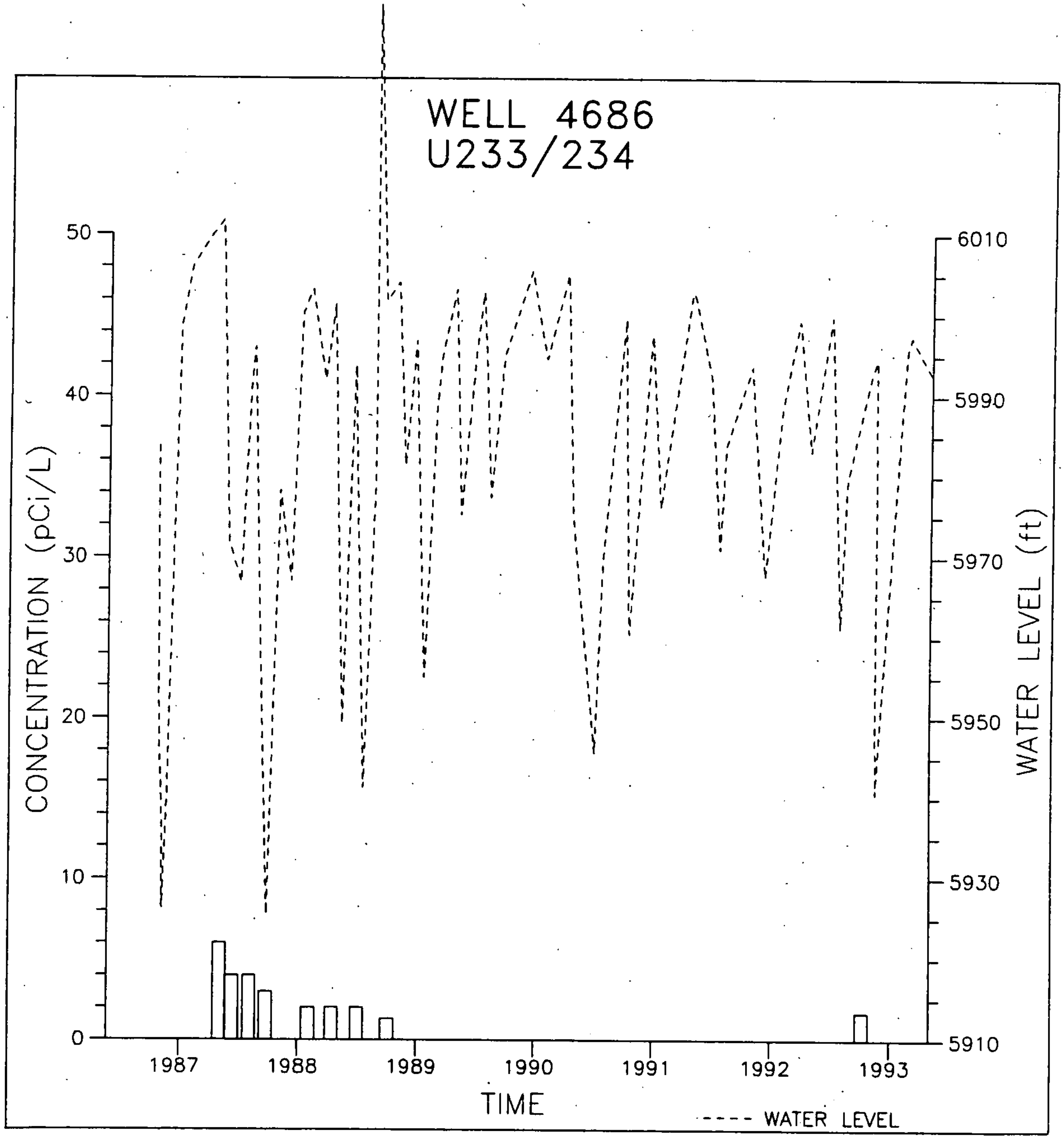
346

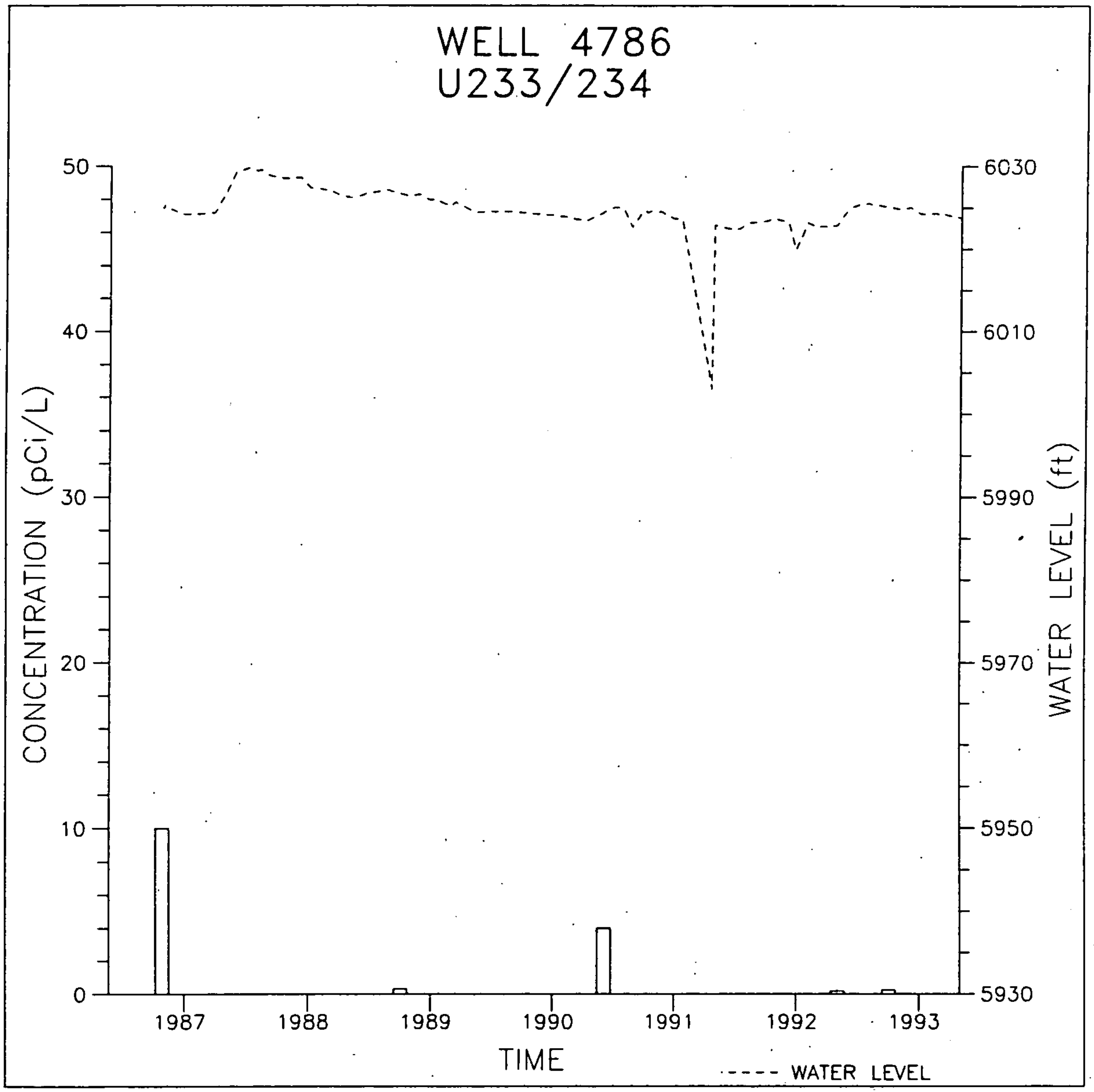


90
60
WELL 3886
U233/234
CONCENTRATION (pCi/L)
50
40
30
20
10
0
WATER LEVEL (ft)
5730
5710
5690
5670
5650
5630
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

347

347

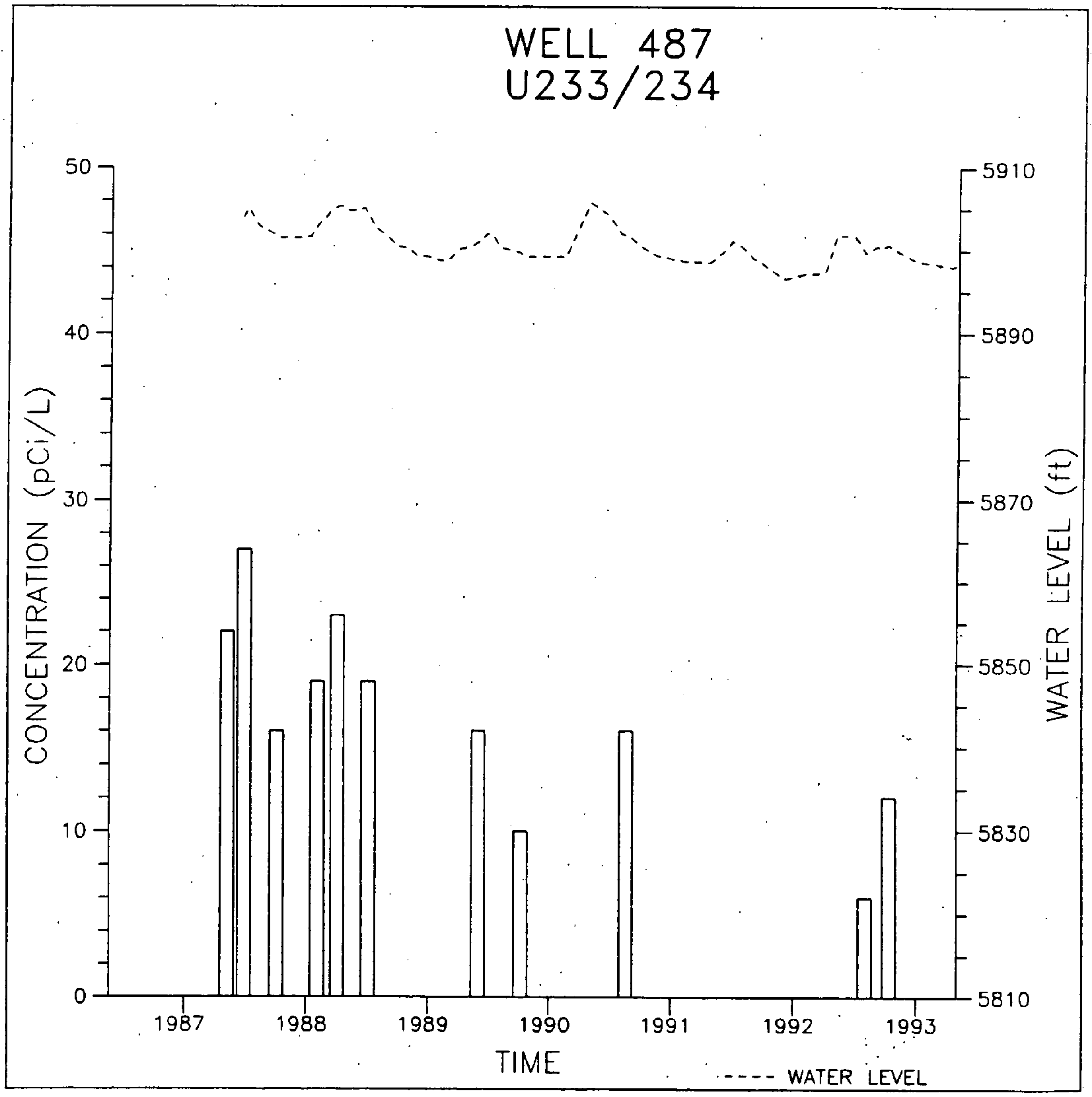

WELL 4686
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
6010
5990
5970
5950
5930
5910
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

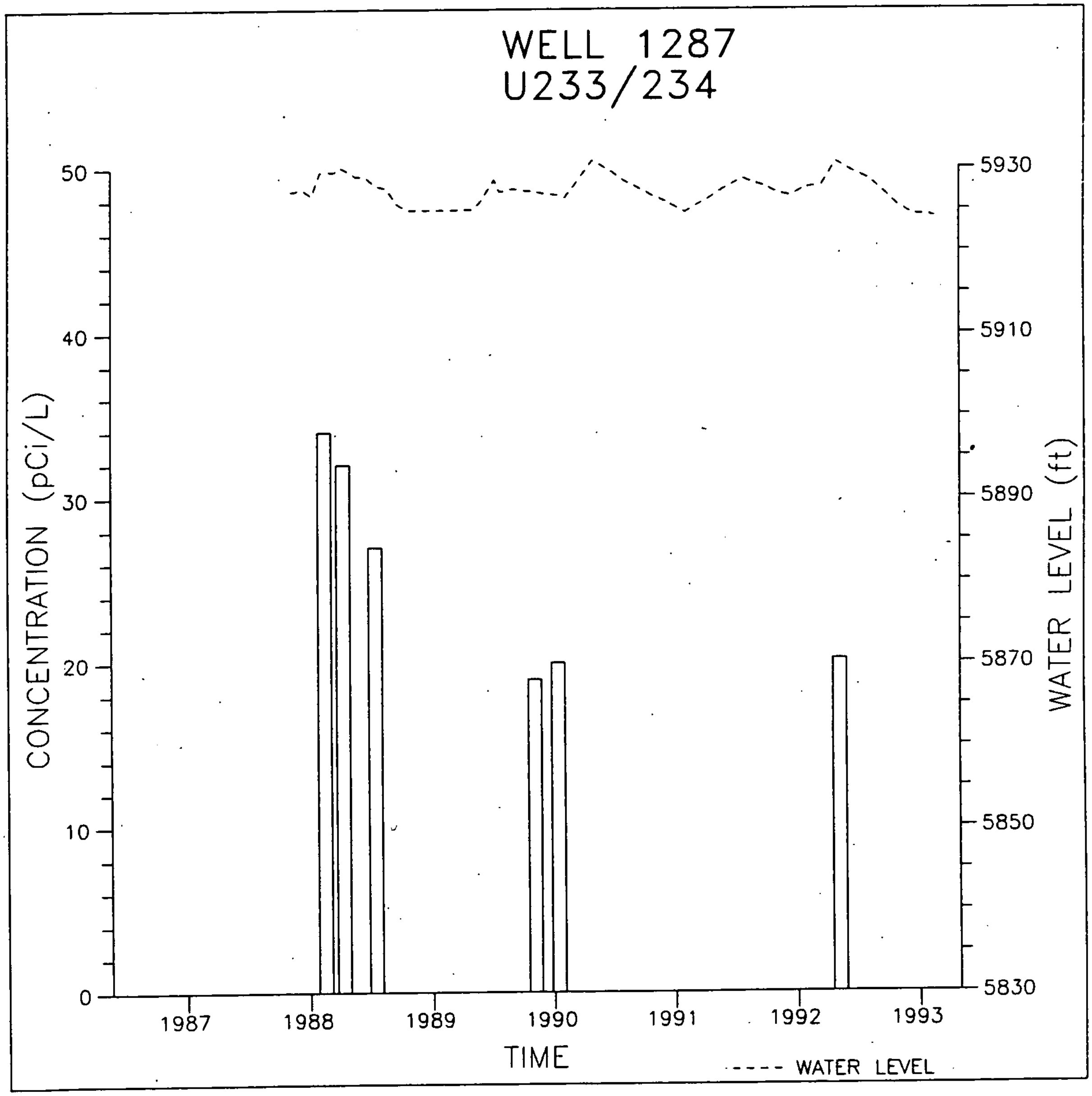


WELL 4786
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
0
10
20
30
40
50
5930
5950
5970
5990
6010
6030
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

349

349

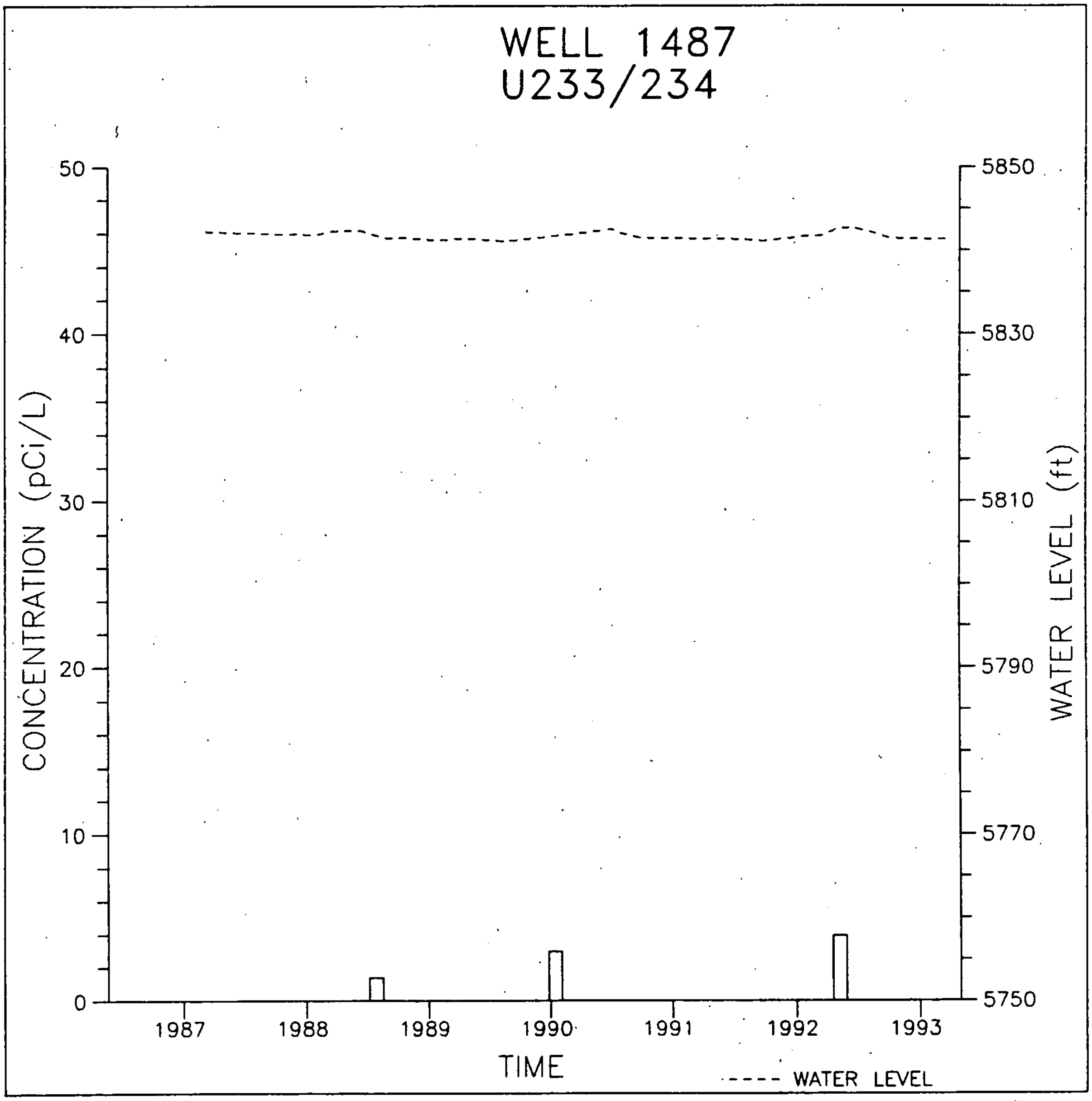

WELL 487
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL 1287
U233/234
CONCENTRATION (pCi/L)
0
10
20
30
40
50
5830
5850
5870
5890
5910
5930
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

351

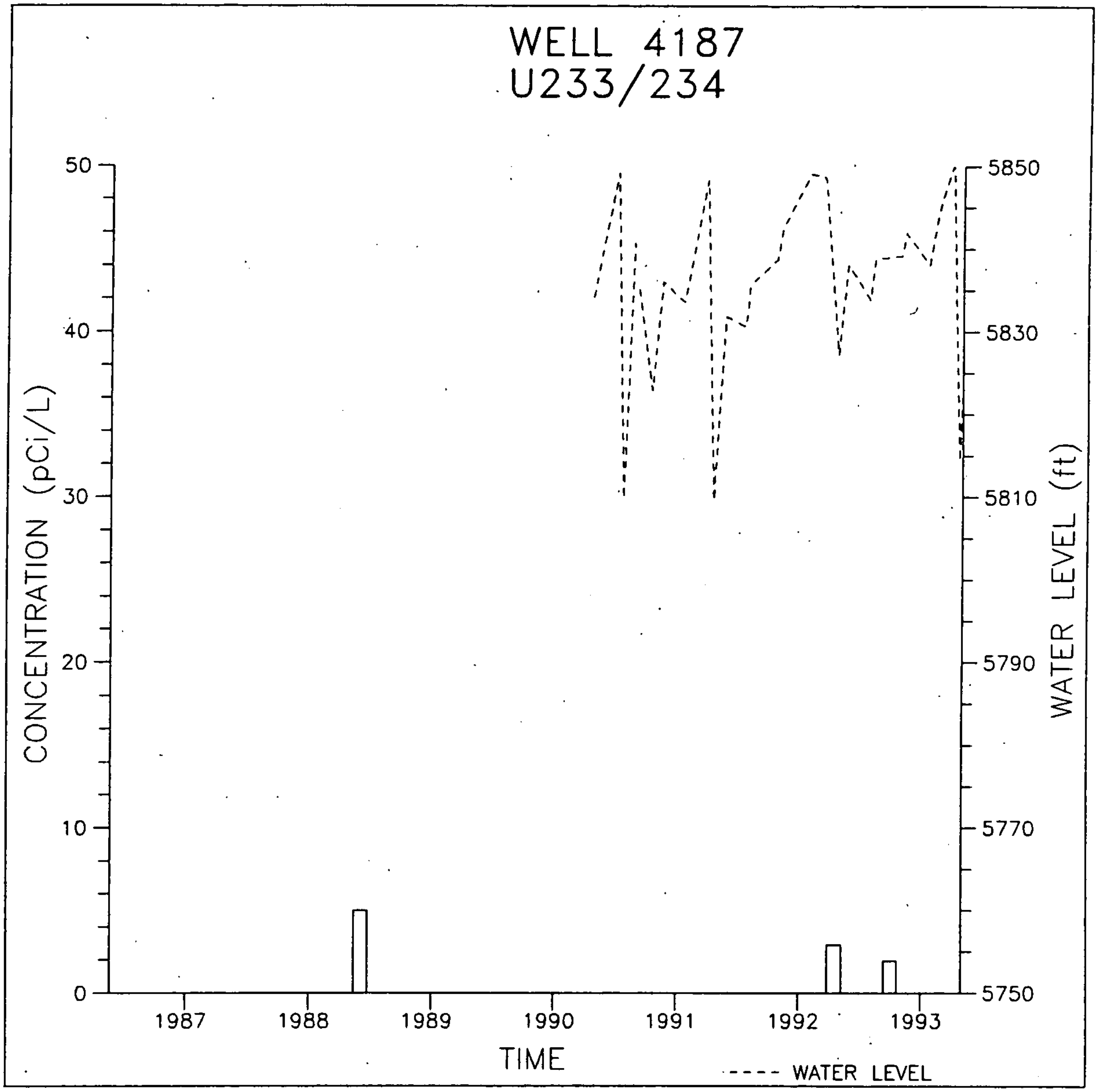
351



WELL 1487
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

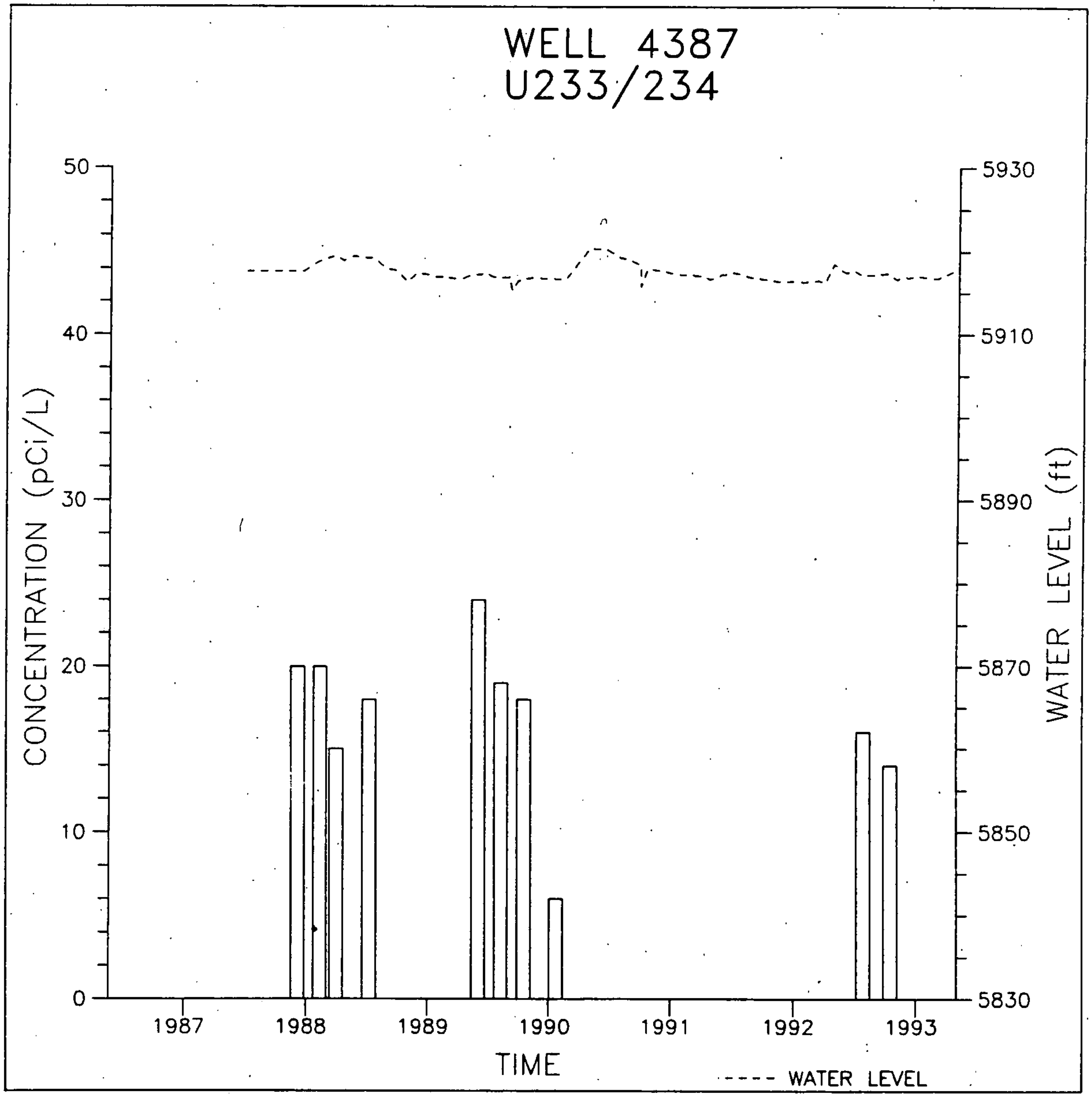
352

352

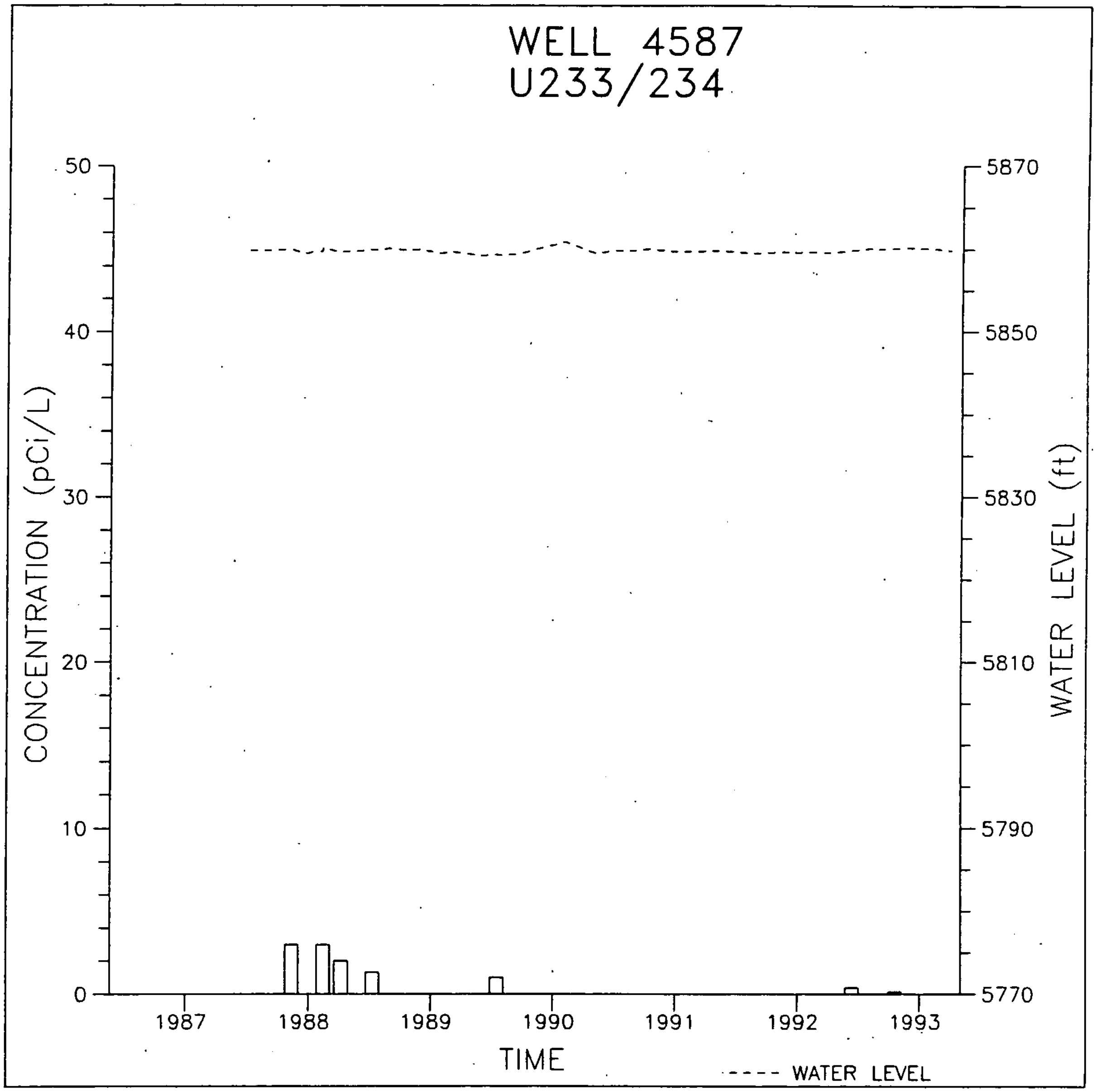


WELL 4187
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

353

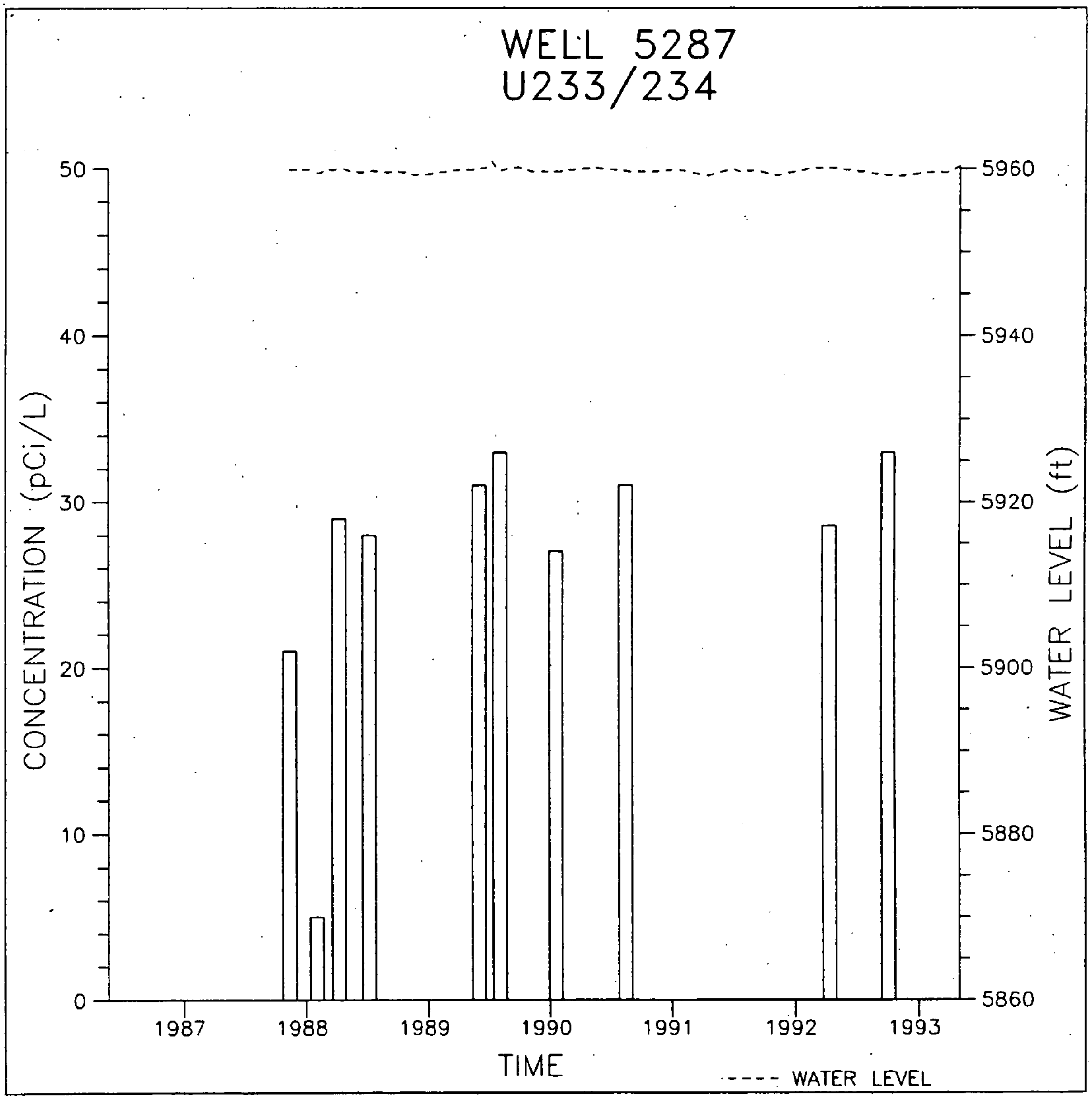

WELL 4387
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

354



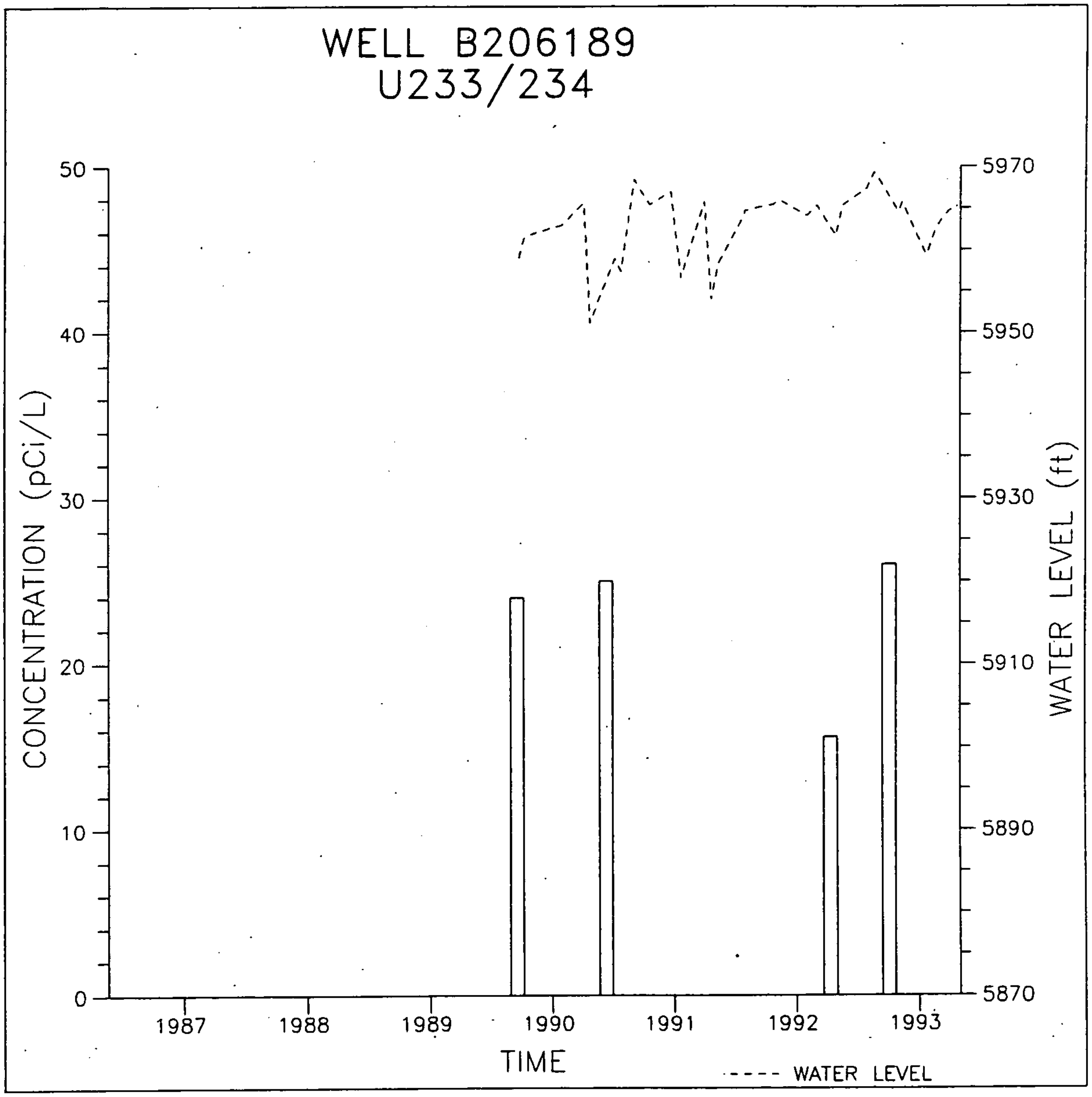
WELL 4587
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

355

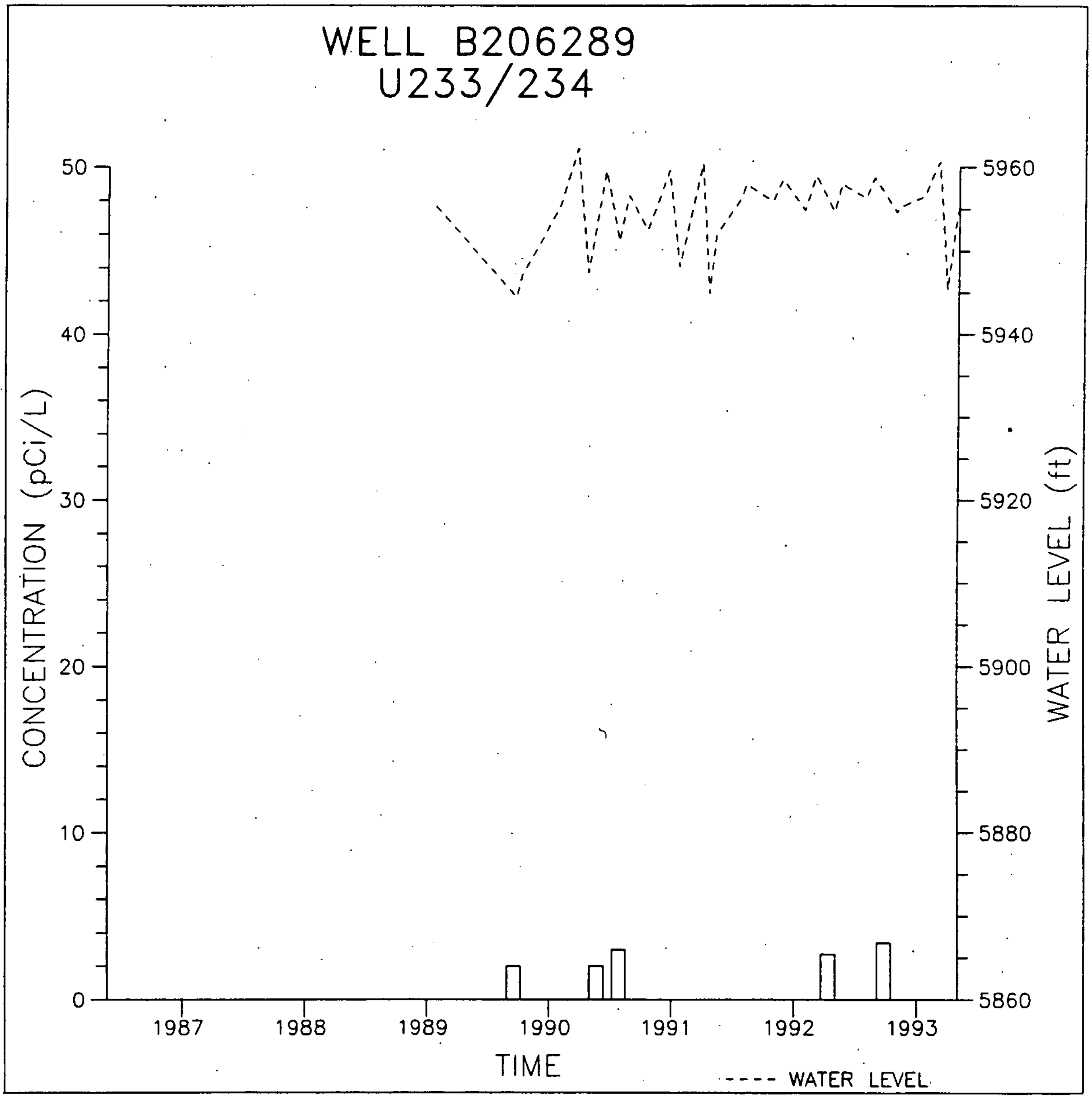


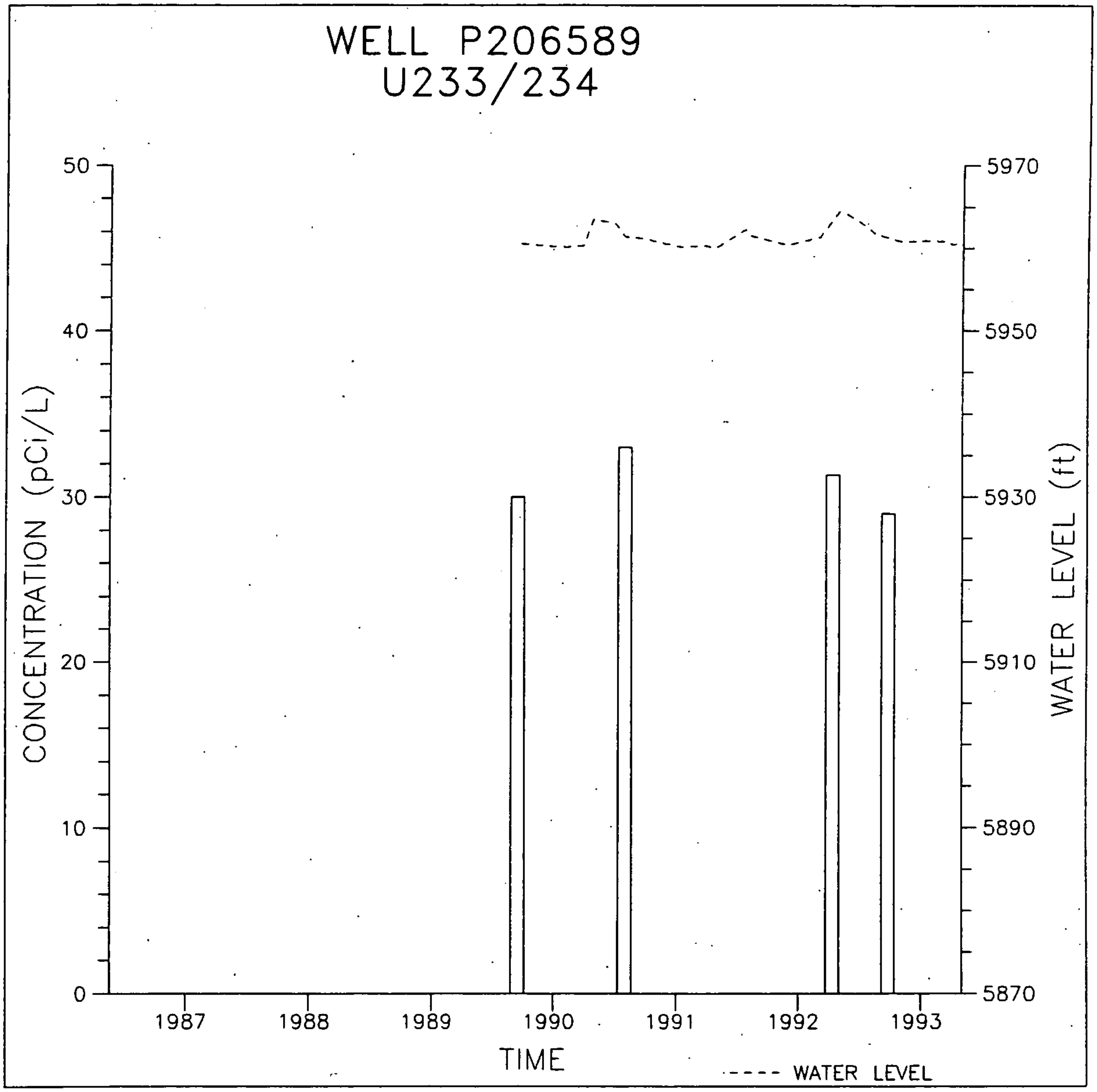
WELL 5287
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
0
10
20
30
40
50
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

356


WELL B206189
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
10
20
30
40
50
5870
5890
5910
5930
5950
5970
1987
1988
1989
1990
1991
1992
1993

357

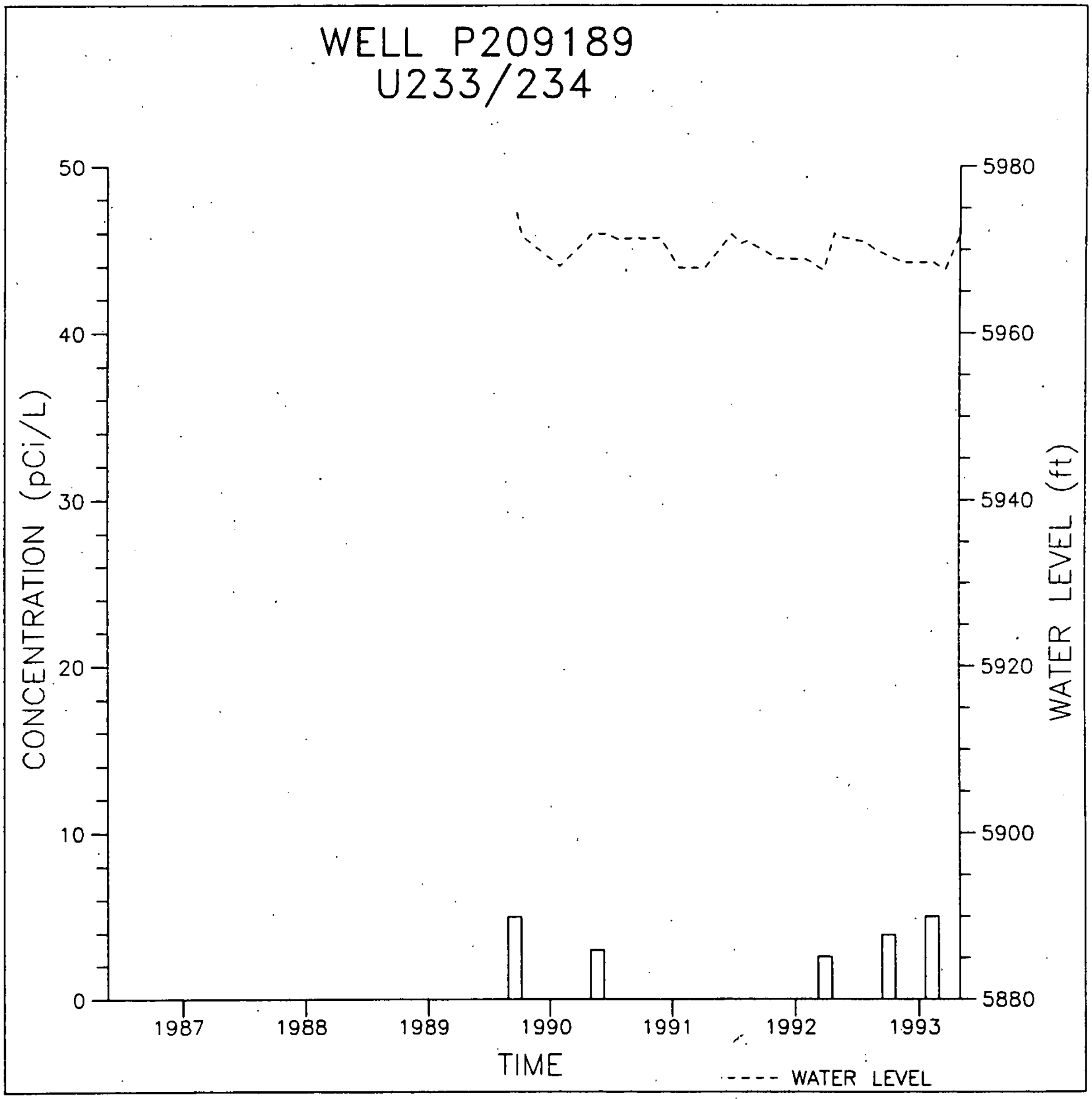

WELL B206289
U233/234
CONCENTRATION (pCi/L)
0
10
20
30
40
50
WATER LEVEL (ft)
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL P206589
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

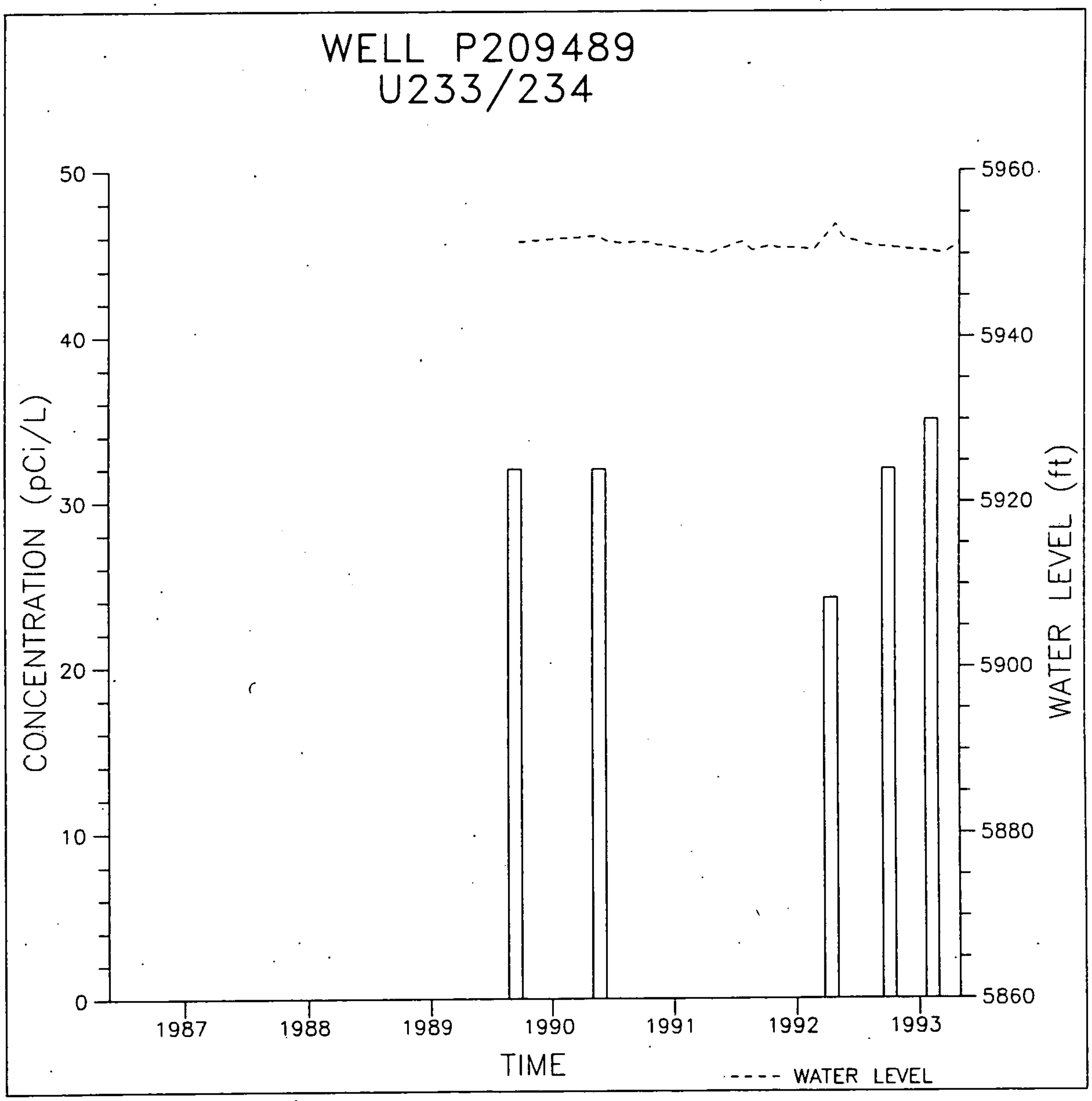
359

354



WELL P209189
U233/234
CONCENTRATION (pCi/L)
0
10
20
30
40
50
WATER LEVEL (ft)
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

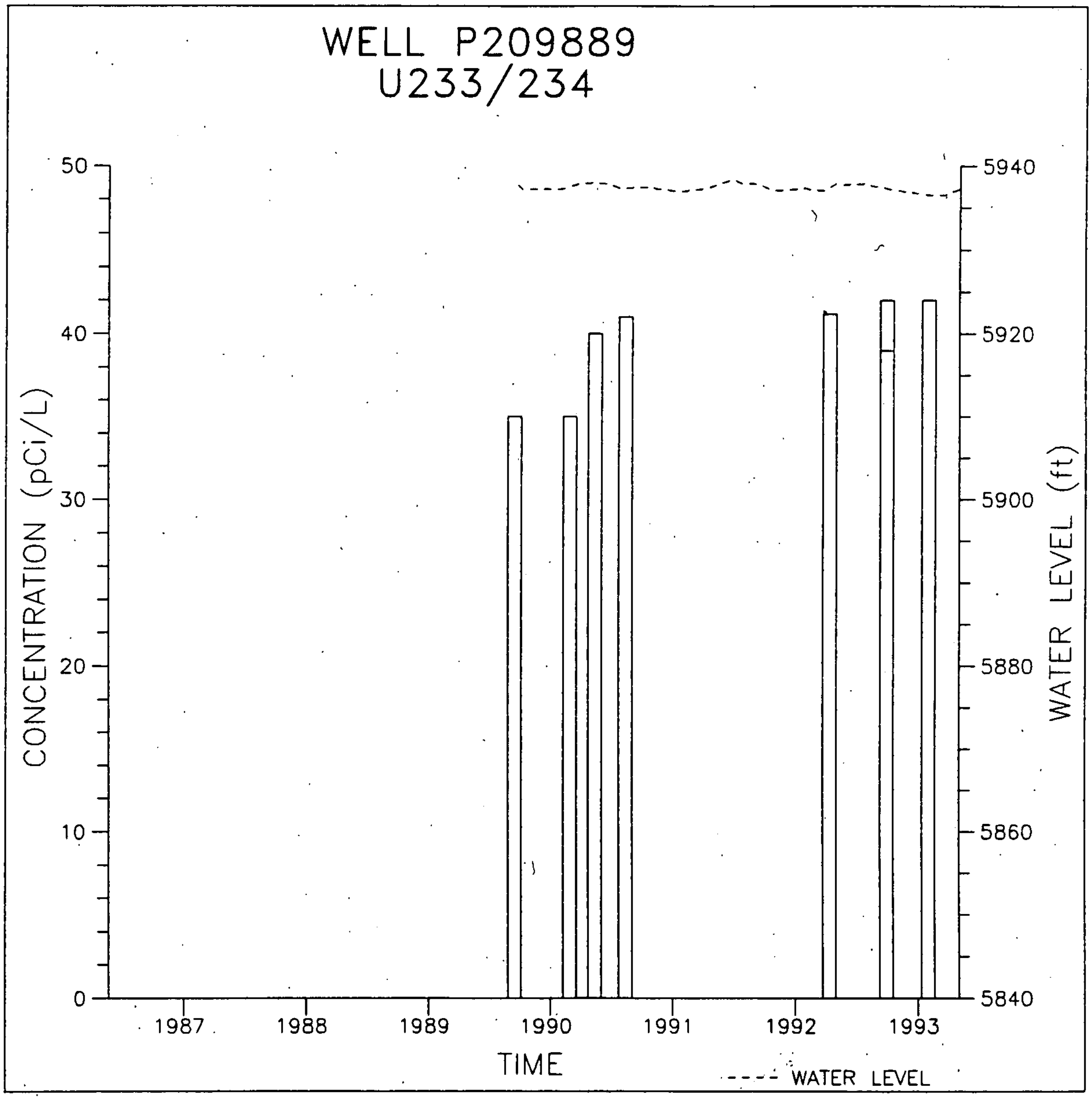
360



WELL P209489
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
TIME
0
10
20
30
40
50
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
---- WATER LEVEL

361

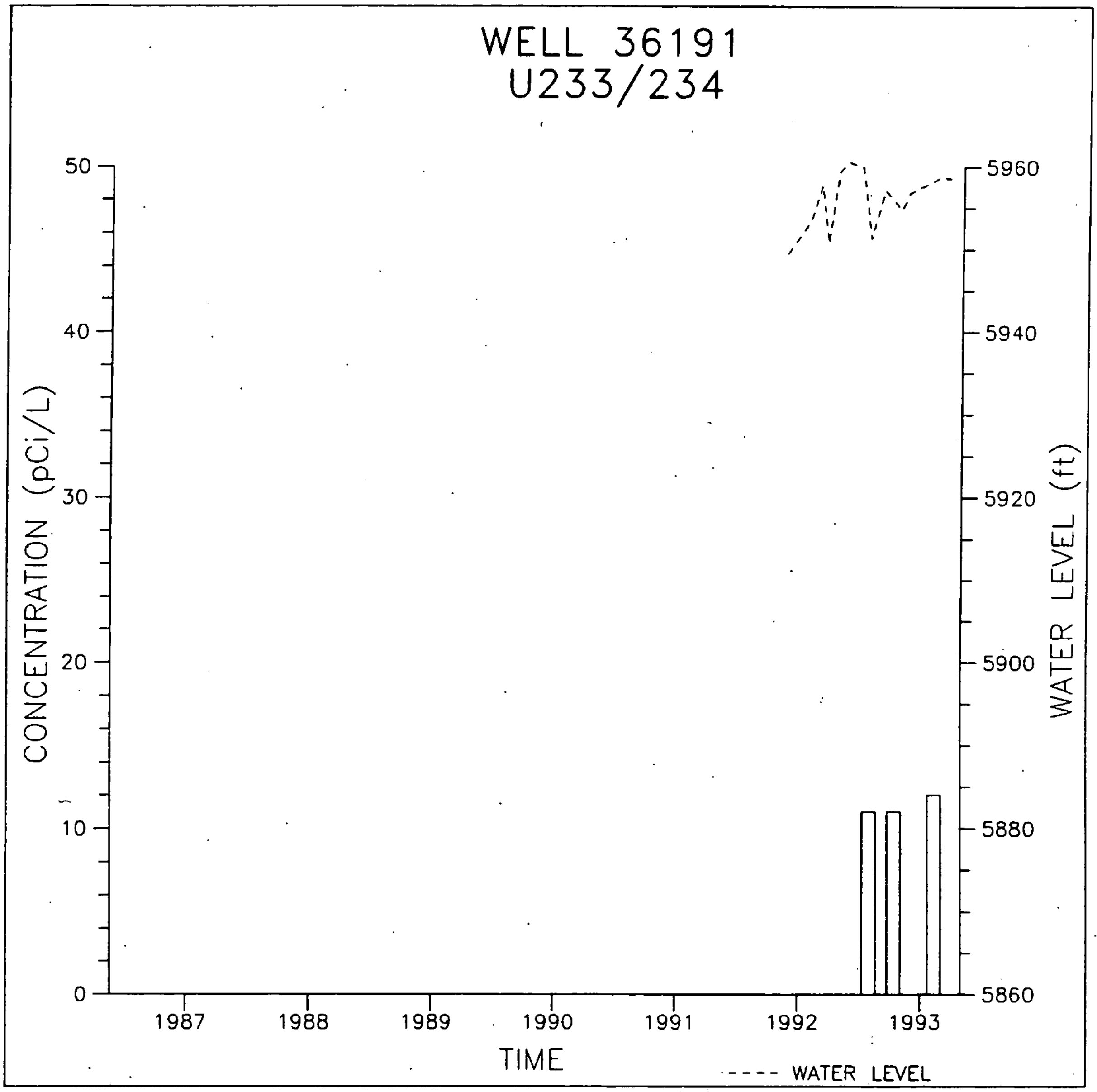
361

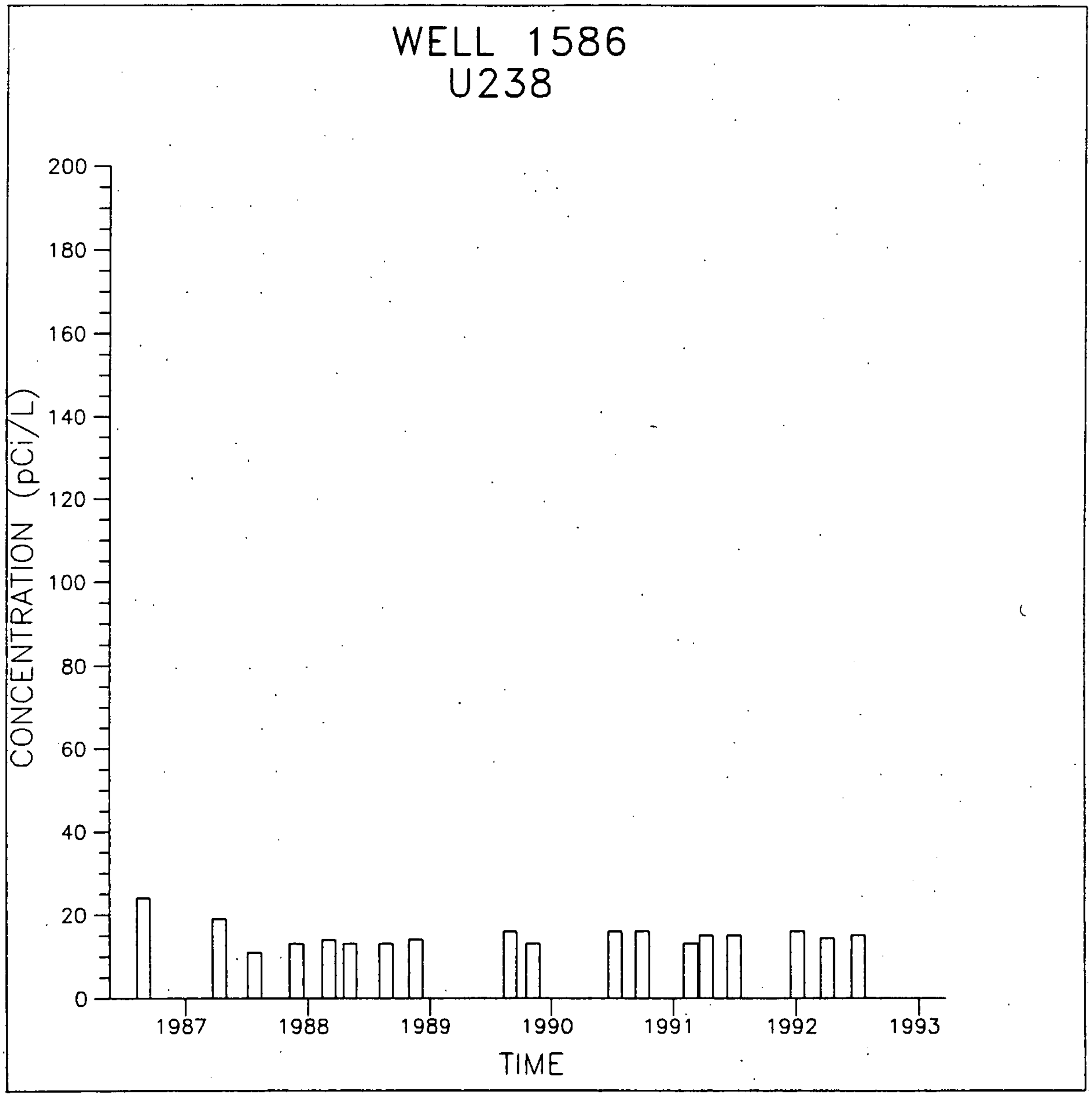


WELL P209889
U233/234
CONCENTRATION (pCi/L)
0
10
20
30
40
50
WATER LEVEL (ft)
5840
5860
5880
5900
5920
5940
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

362

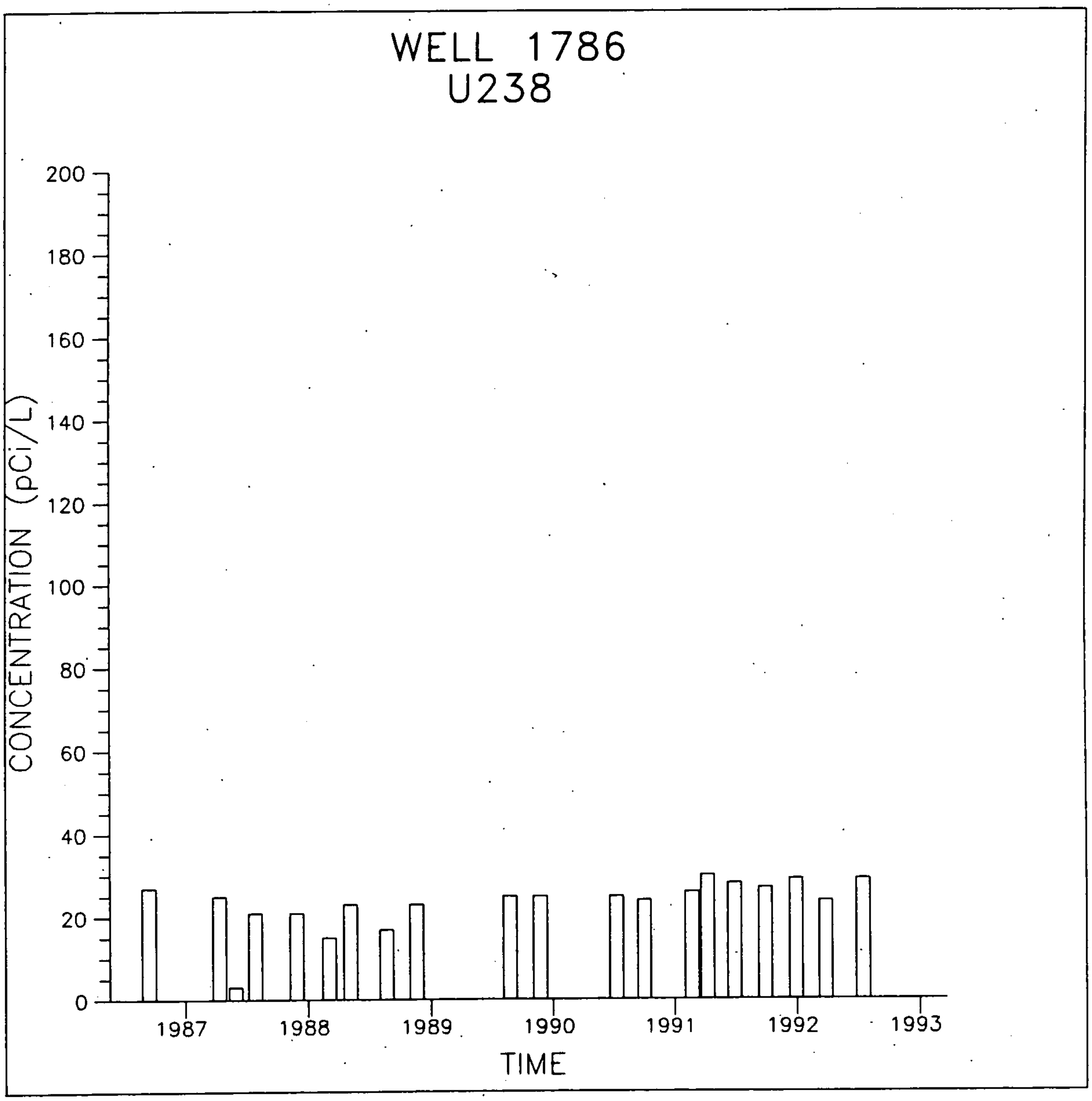
362


WELL 36191
U233/234
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
50
40
30
20
10
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

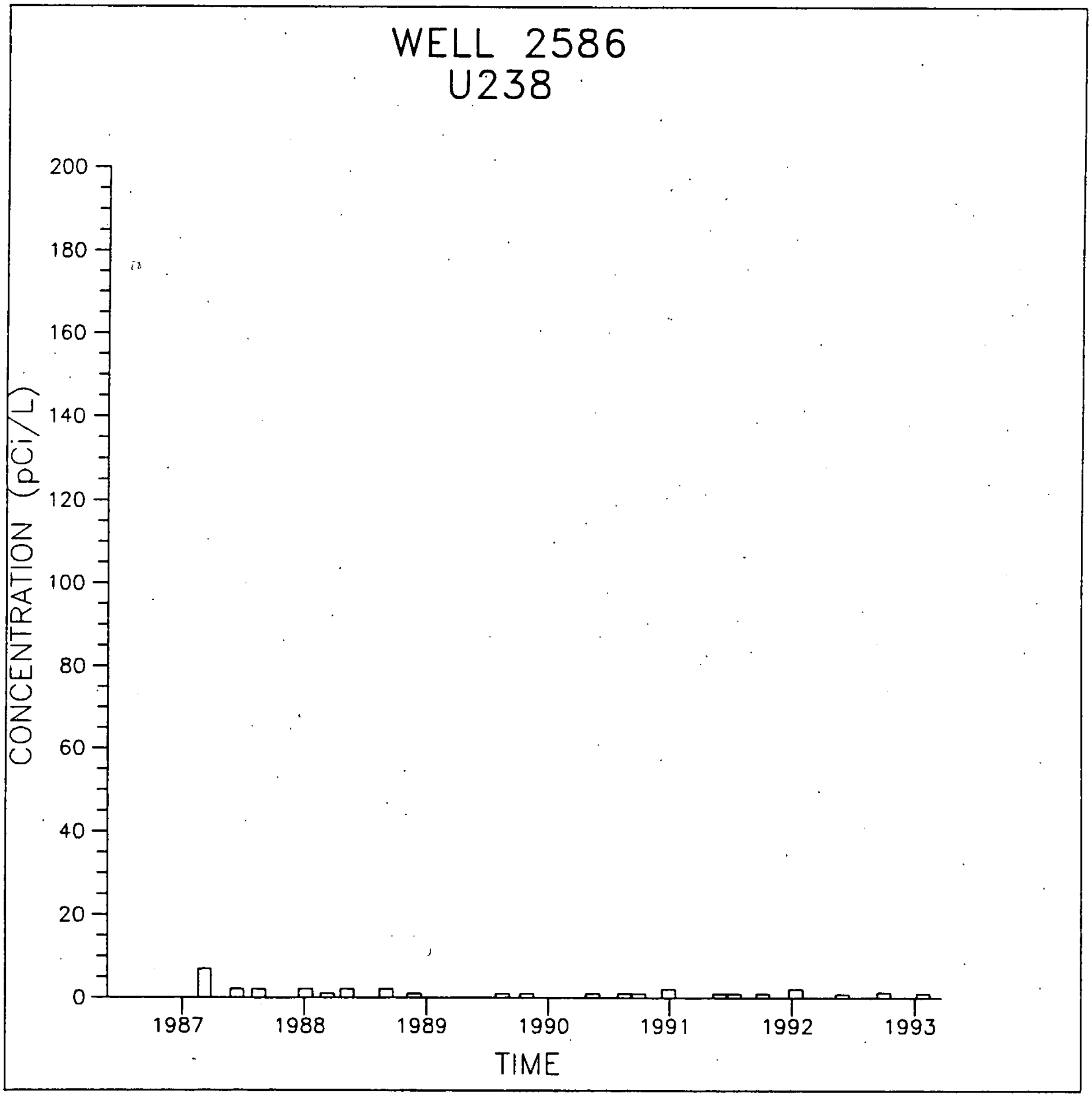

WELL 1586
U238
CONCENTRATION (pCi/L)
0
20
40
60
80
100
120
140
160
180
200
1987
1988
1989
1990
1991
1992
1993
TIME

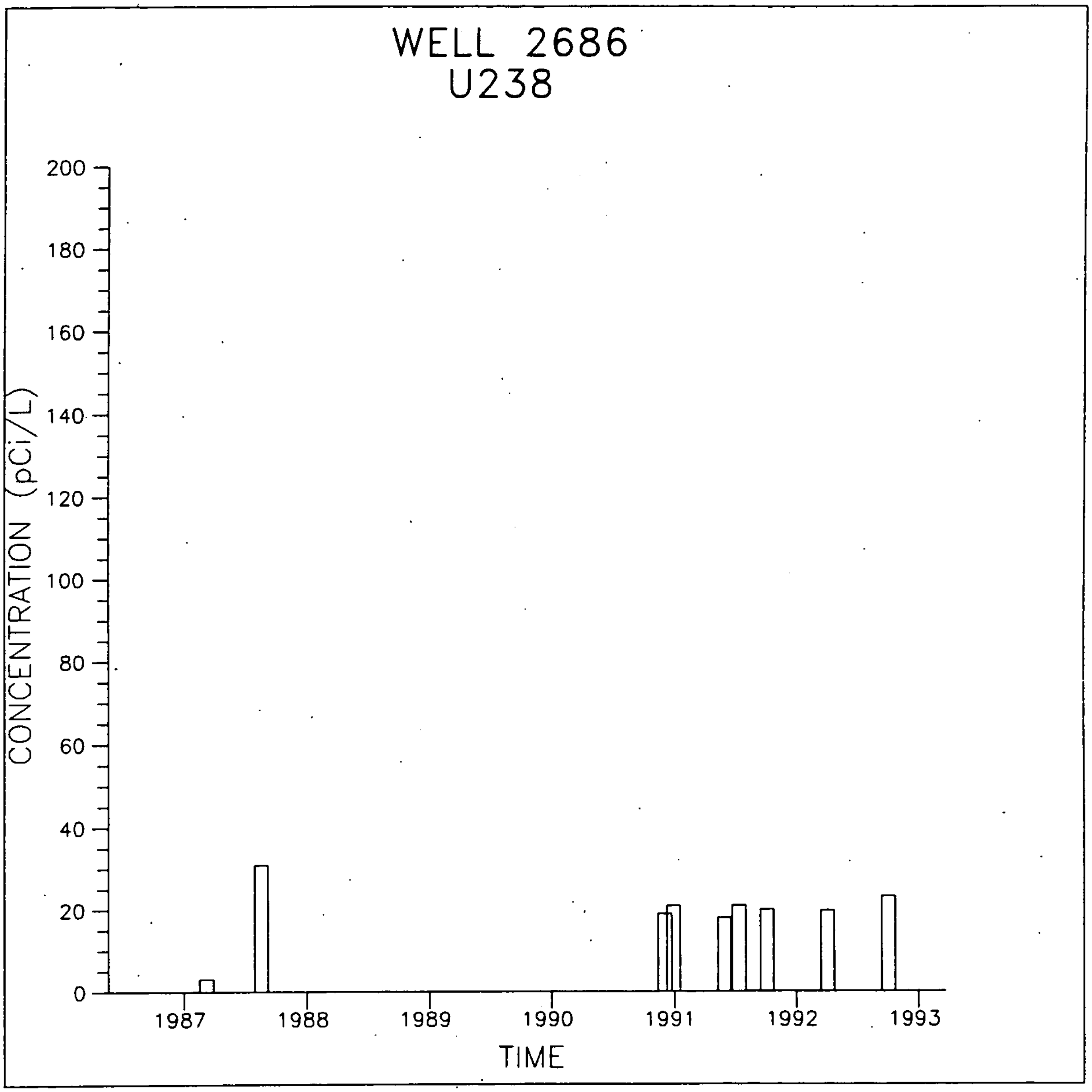
364

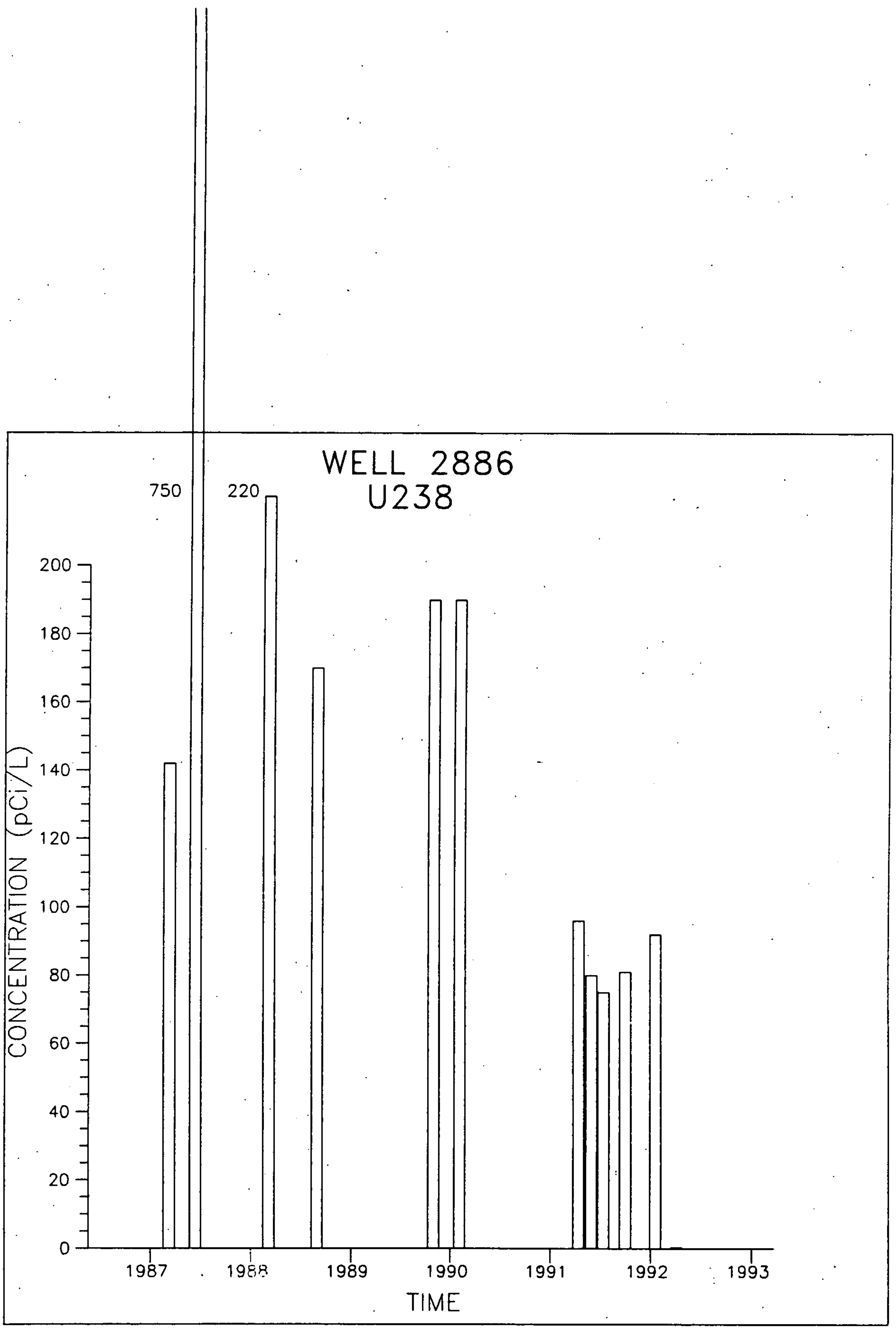
364



WELL 1786
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

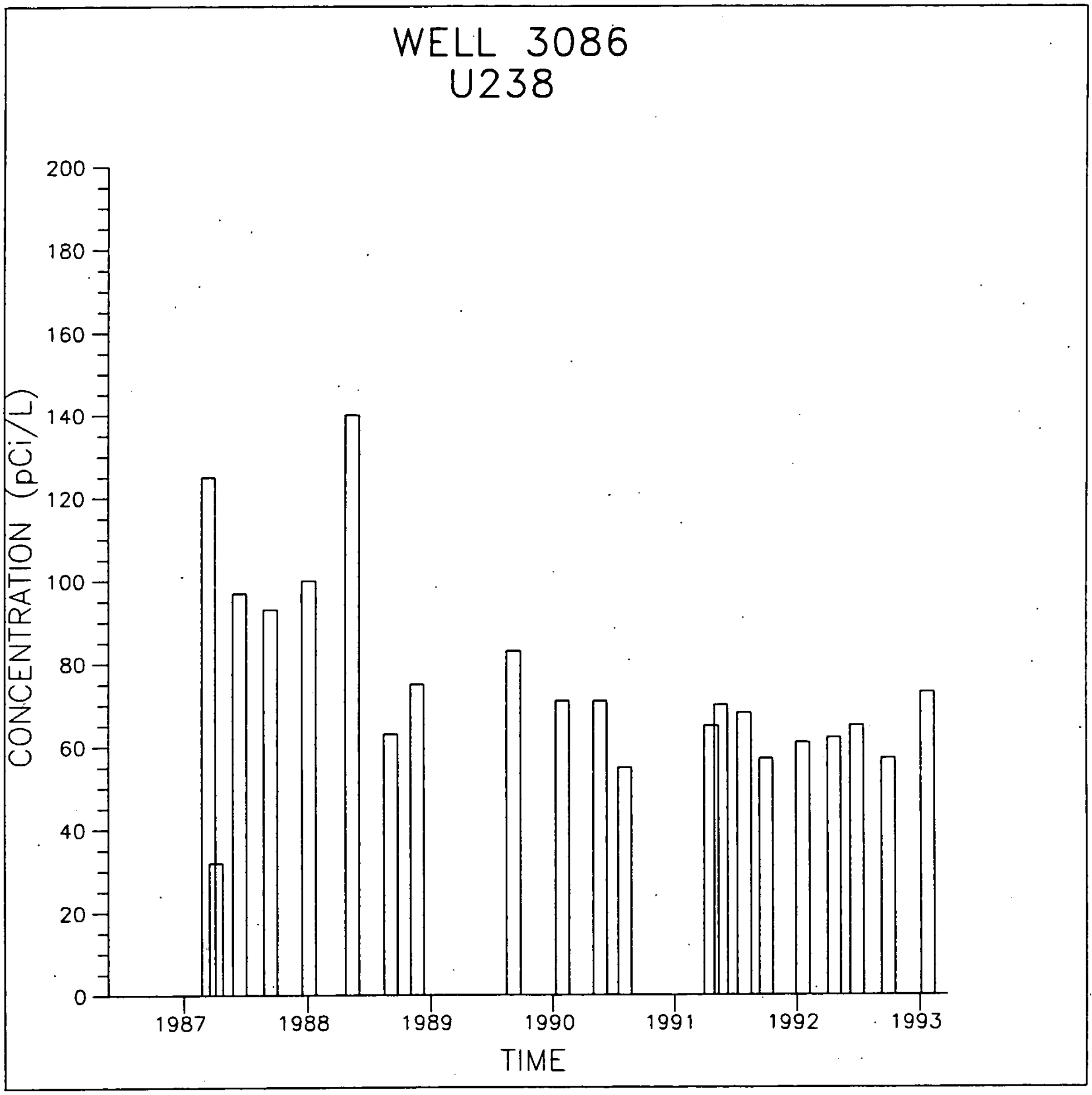

WELL 2586
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

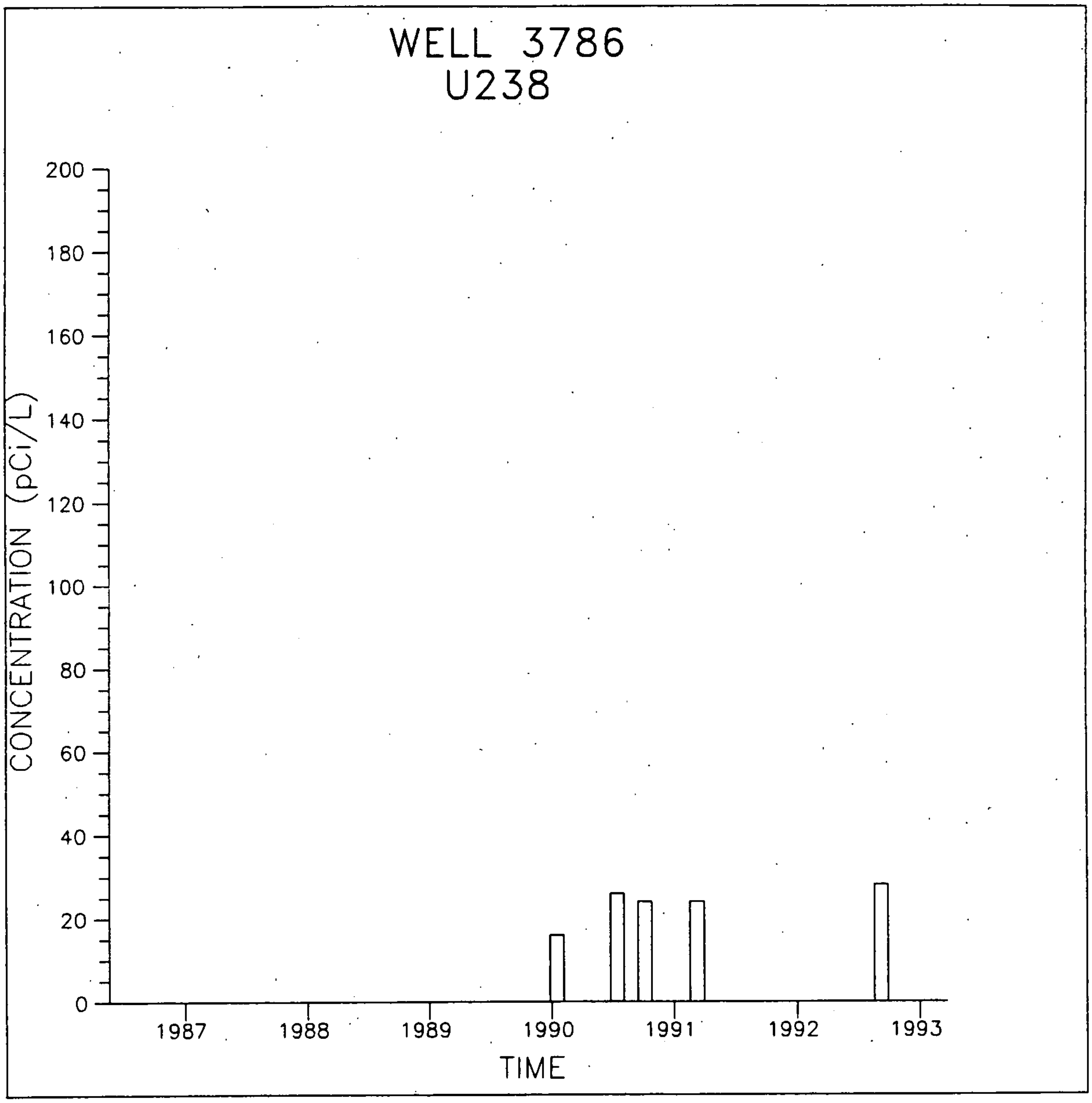

WELL 2686
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME



WELL 2886
U238
750
220
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

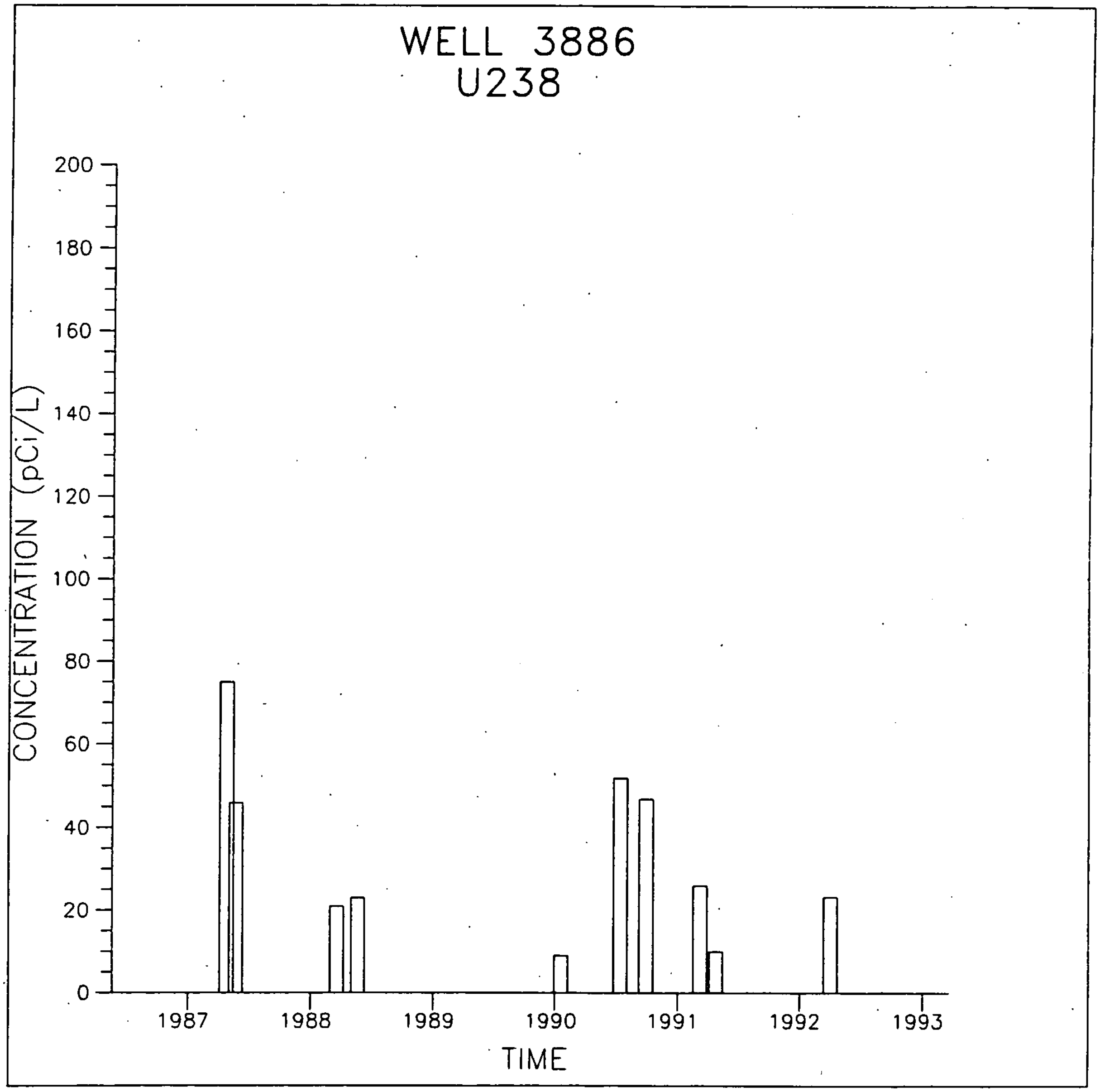
368


WELL 3086
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME


WELL 3786
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

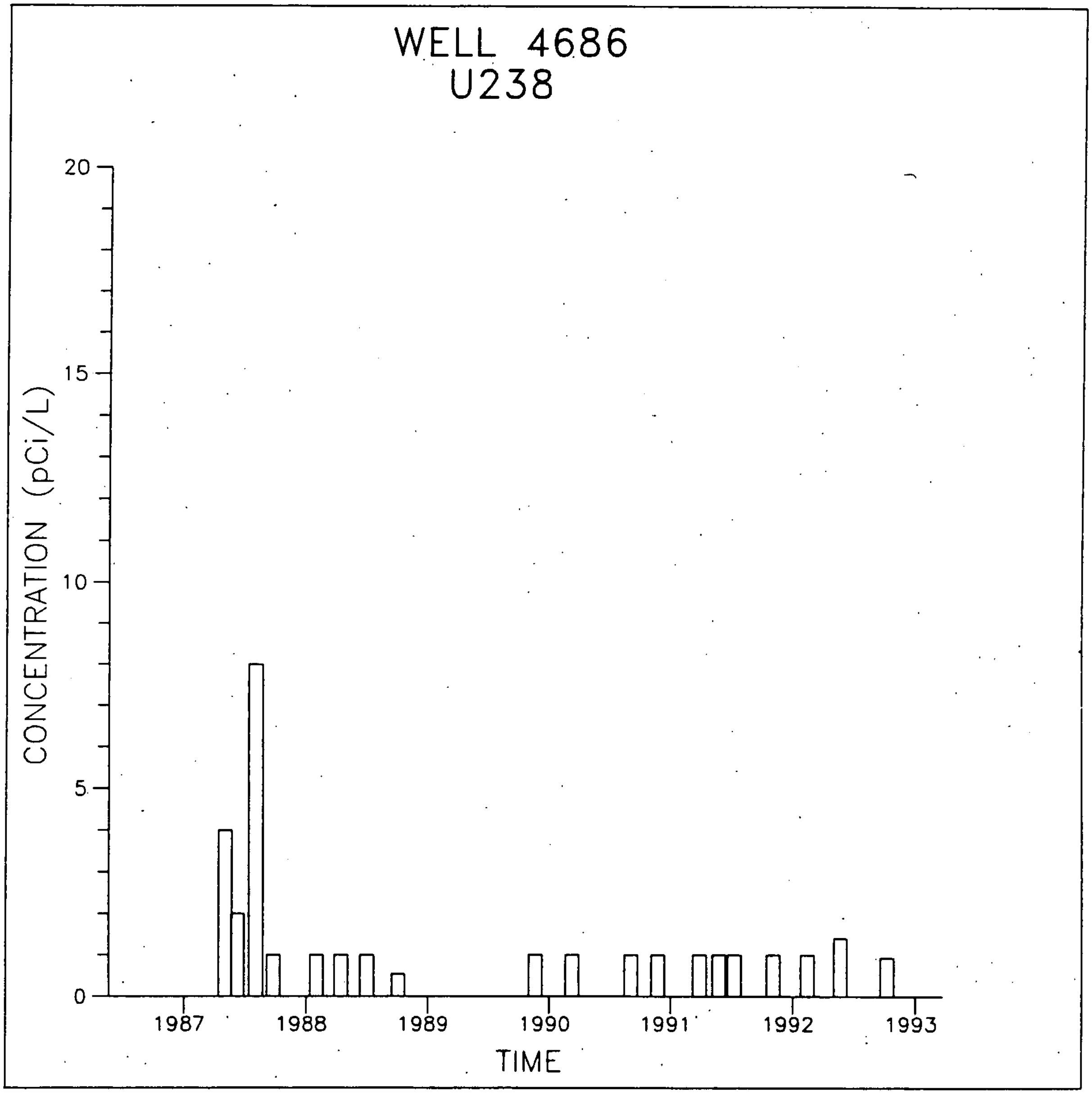
370

370


WELL 3886
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

371

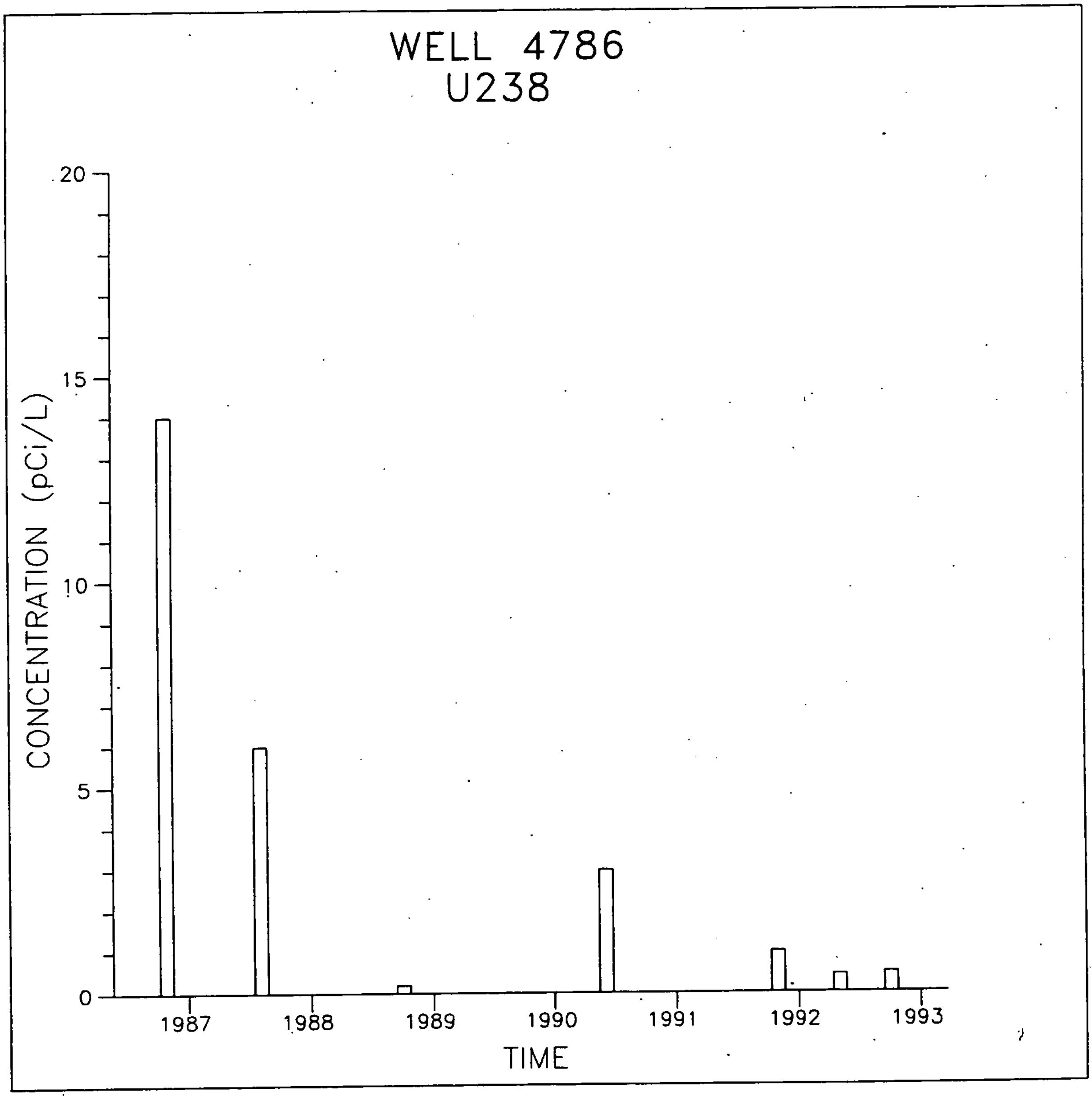
371



WELL 4686
U238
CONCENTRATION (pCi/L)
20
15
10
5
0
1987
1988
1989
1990
1991
1992
1993
TIME

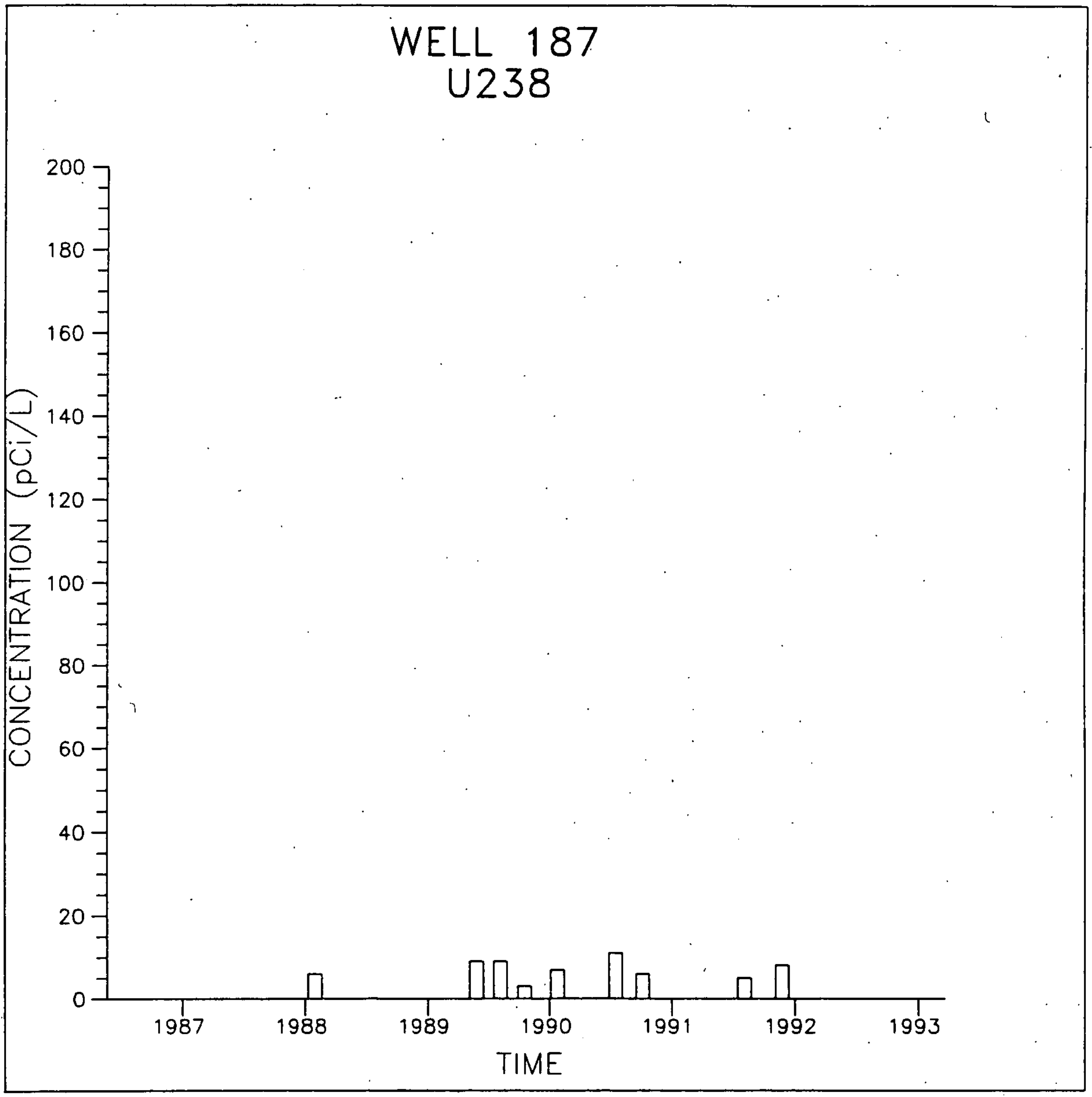
372

372


WELL 4786
U238
CONCENTRATION (pCi/L)
0
5
10
15
20
1987
1988
1989
1990
1991
1992
1993
TIME

373

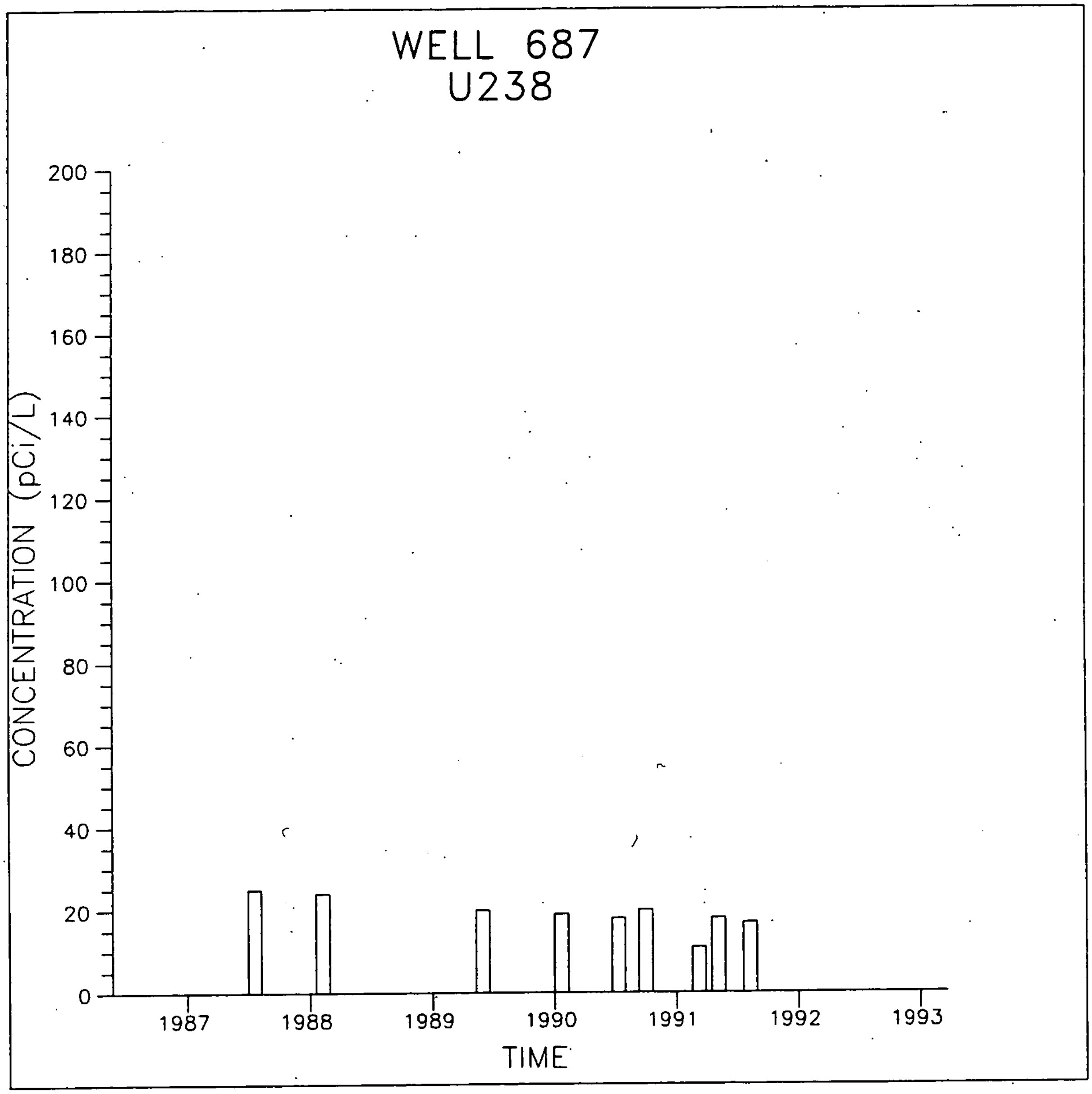
373



WELL 187
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

374

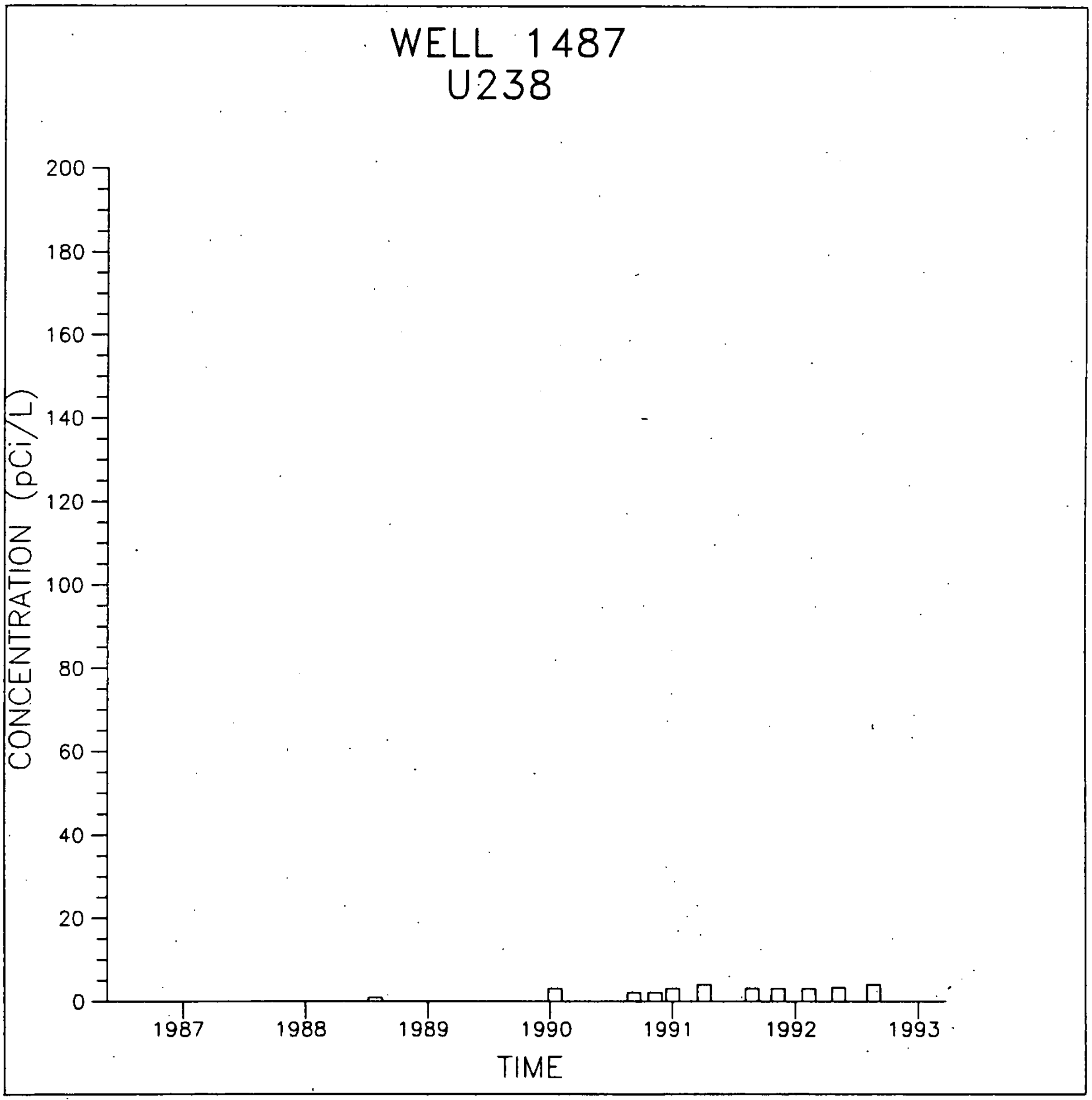
~~374~~



WELL 687
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

375

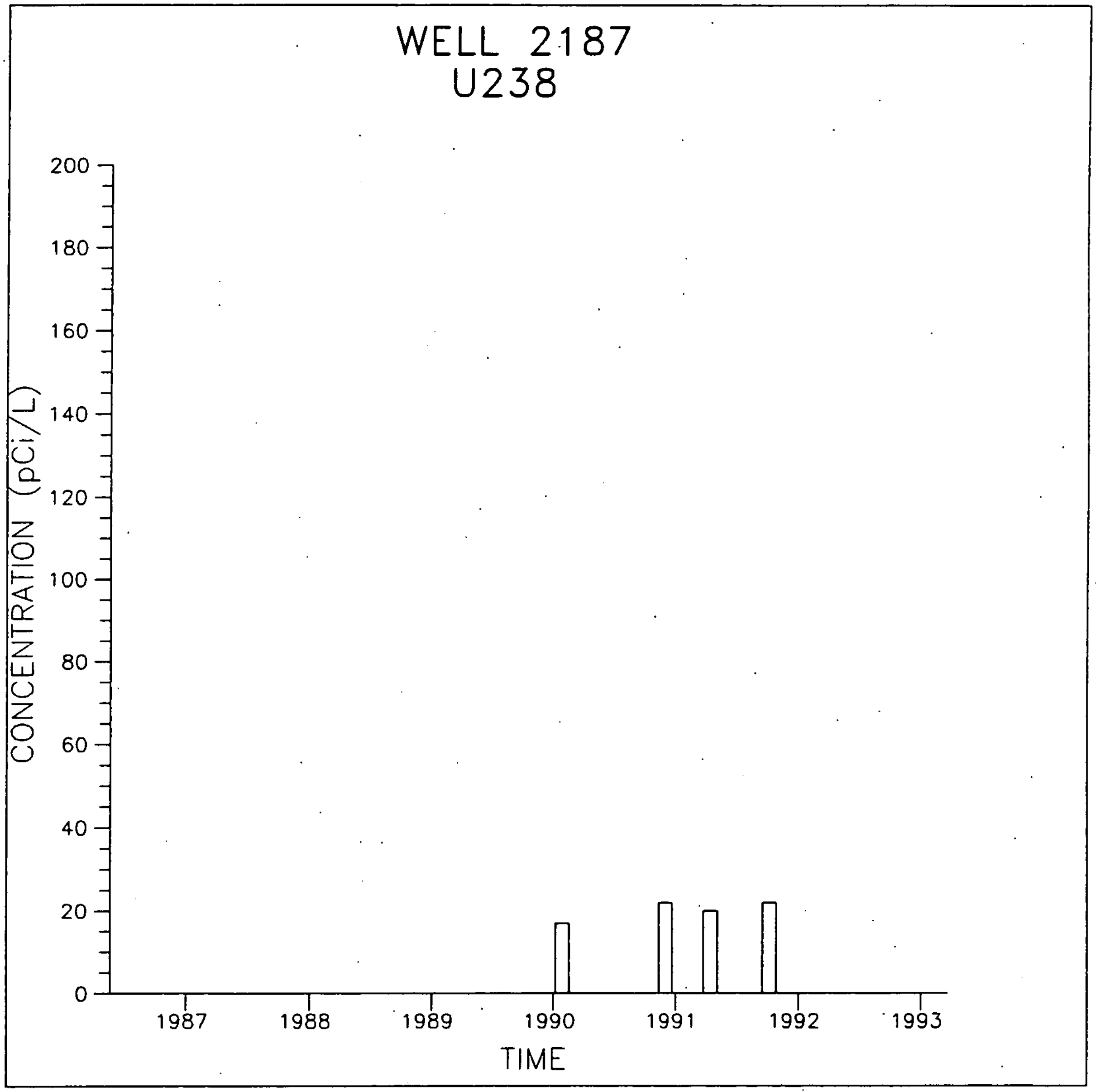
3̶7̶5̶ 376



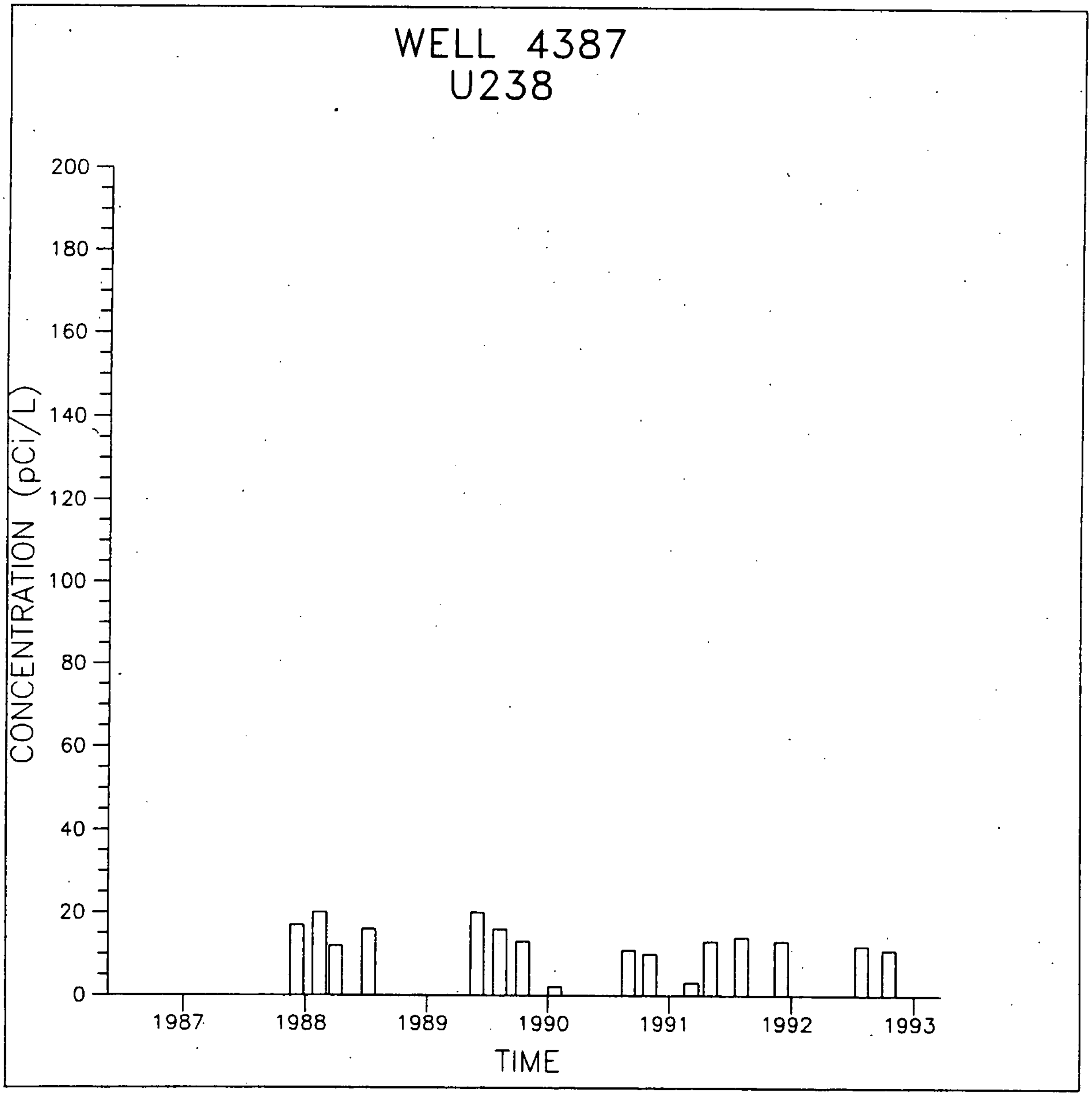
WELL 1487
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

376

376



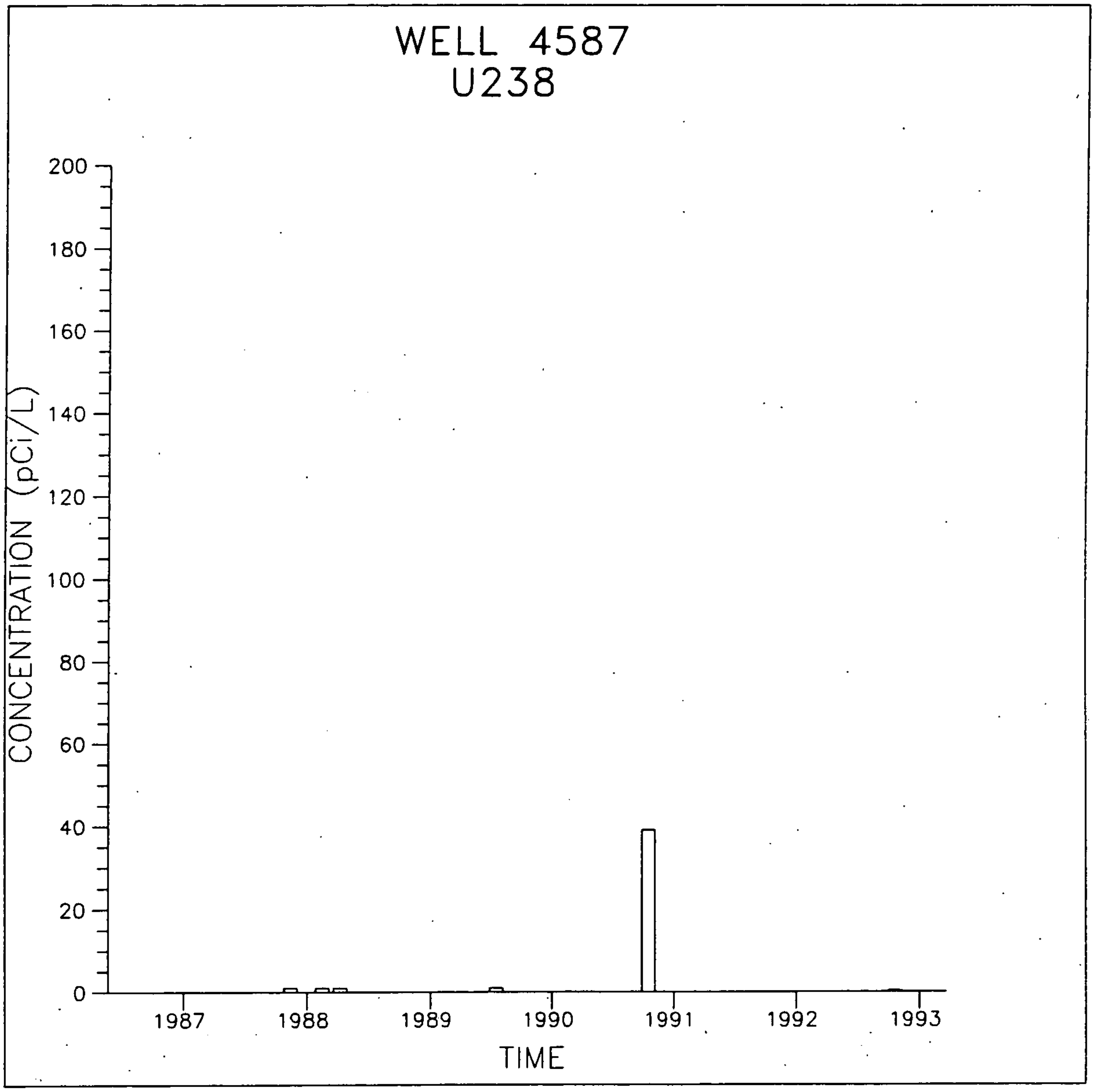
WELL 2187
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME



WELL 4387
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

378

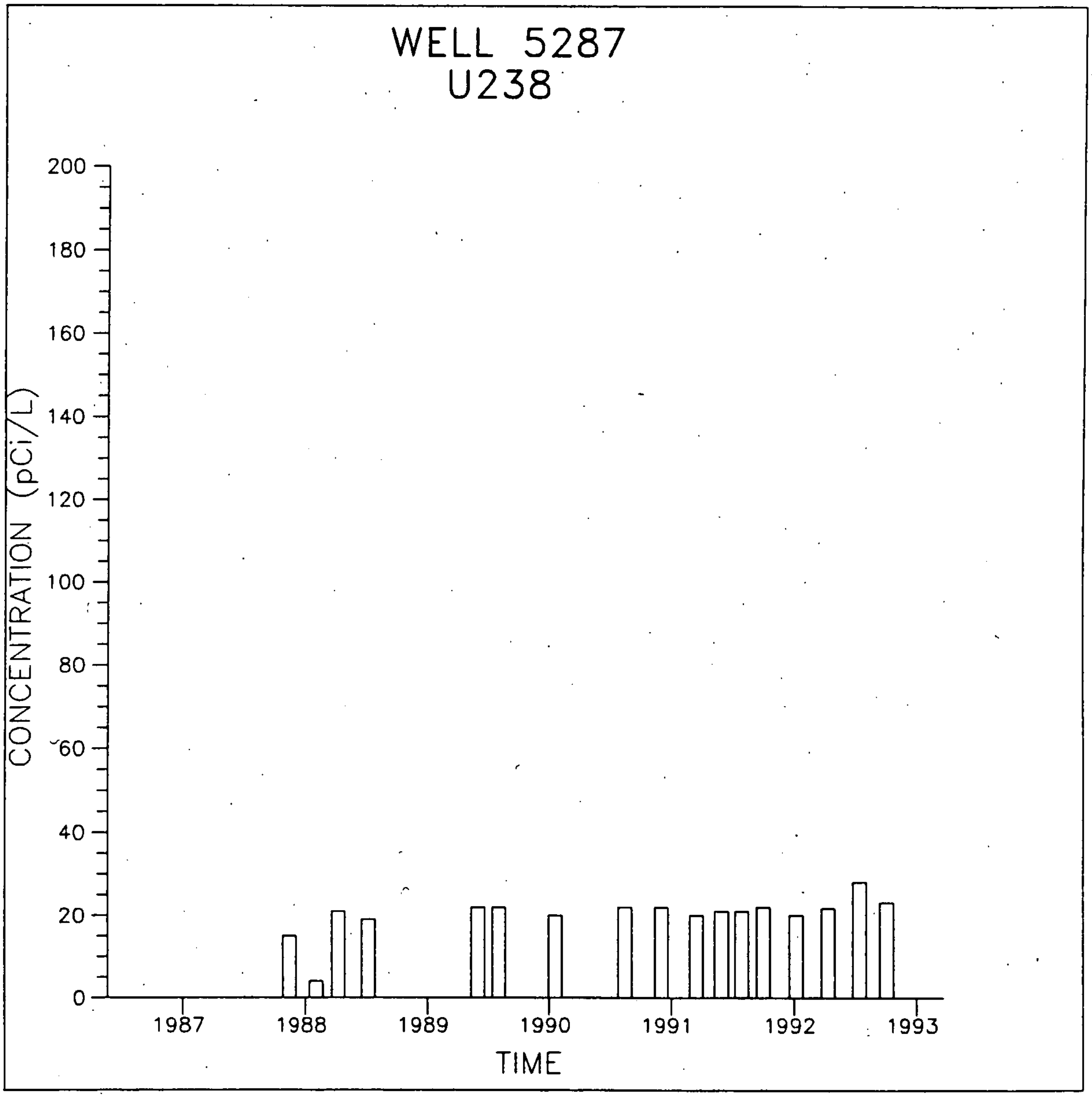
378



WELL 4587
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

379

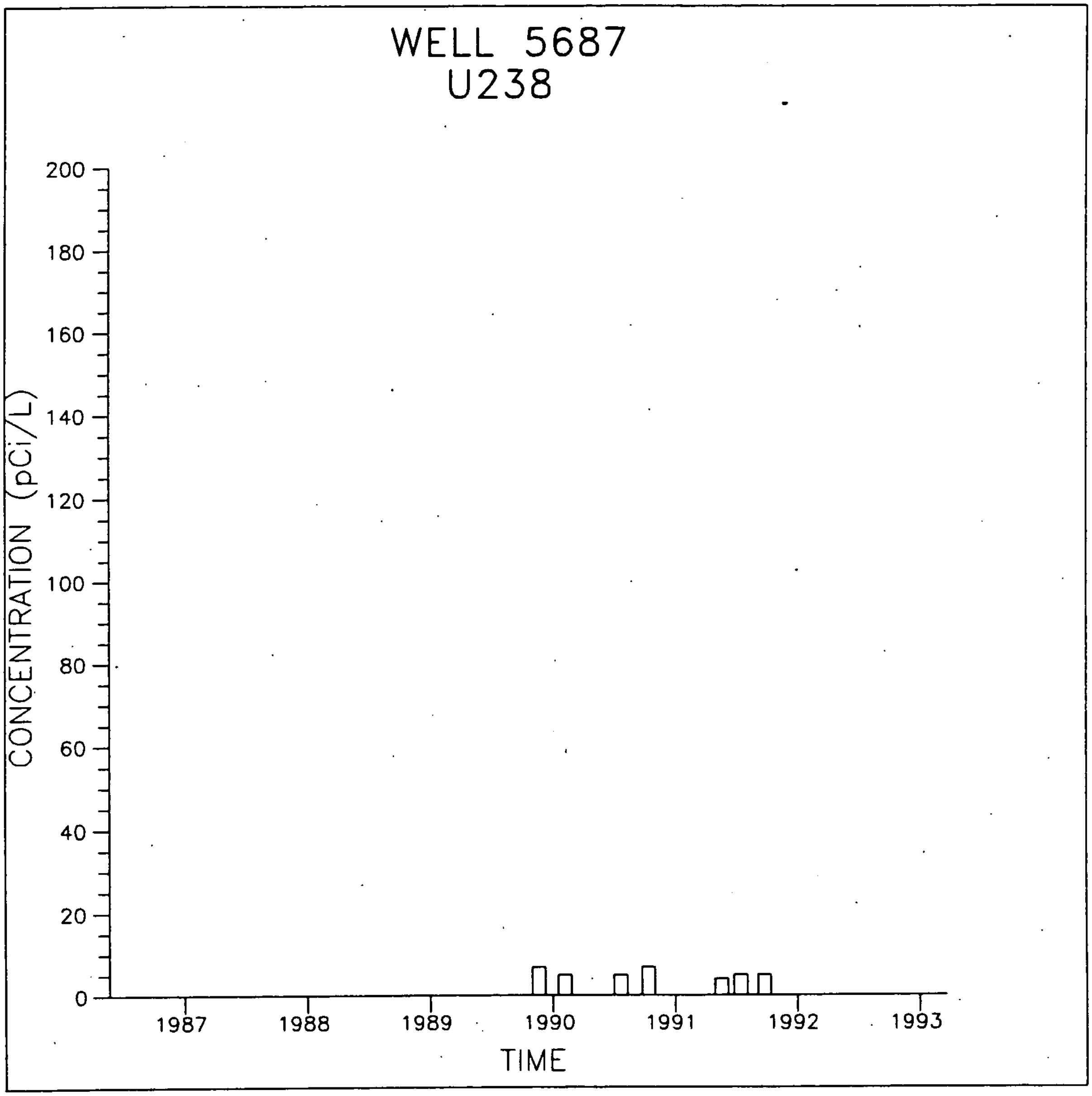
379



WELL 5287
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

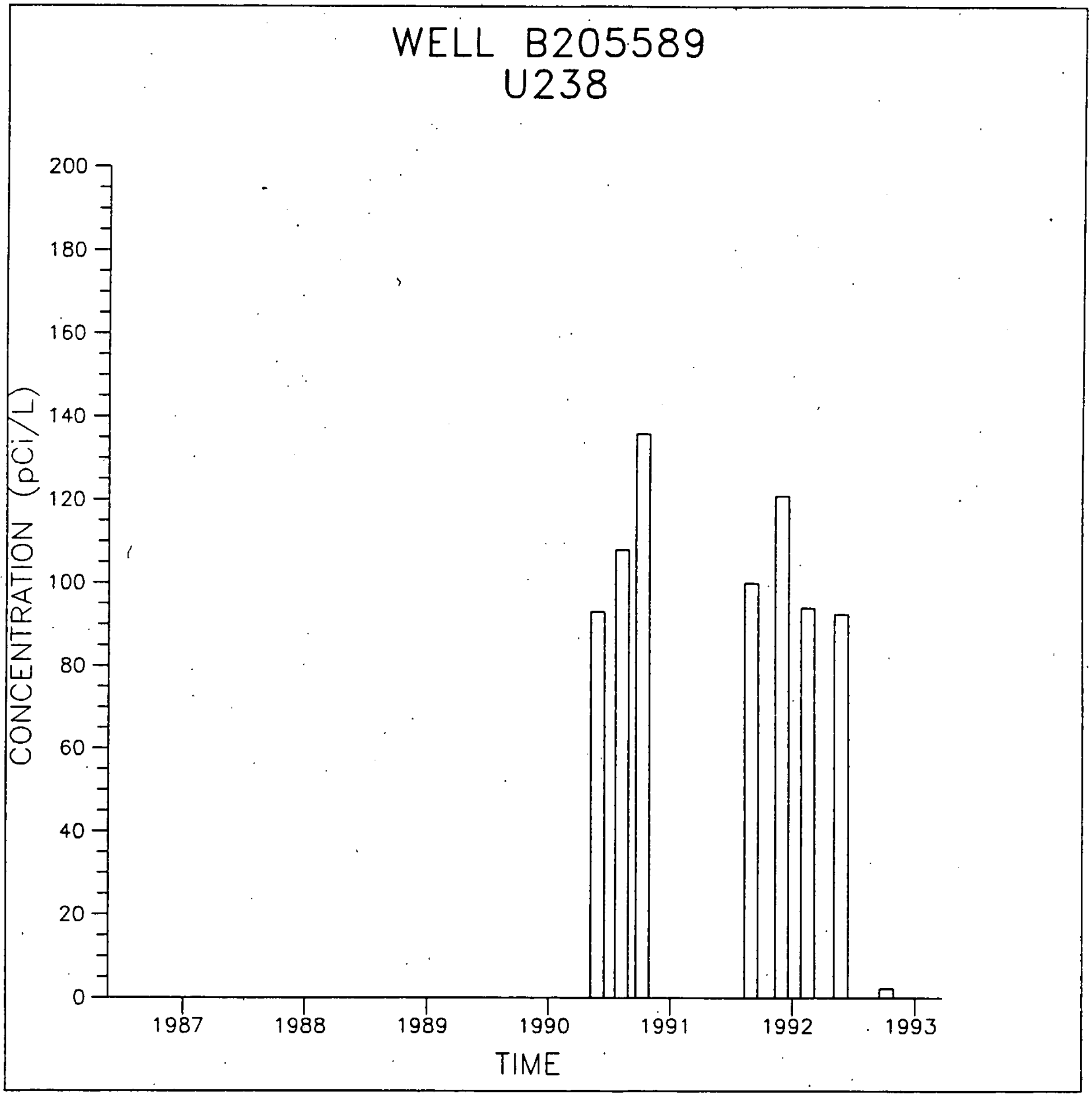
380

386


WELL 5687
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

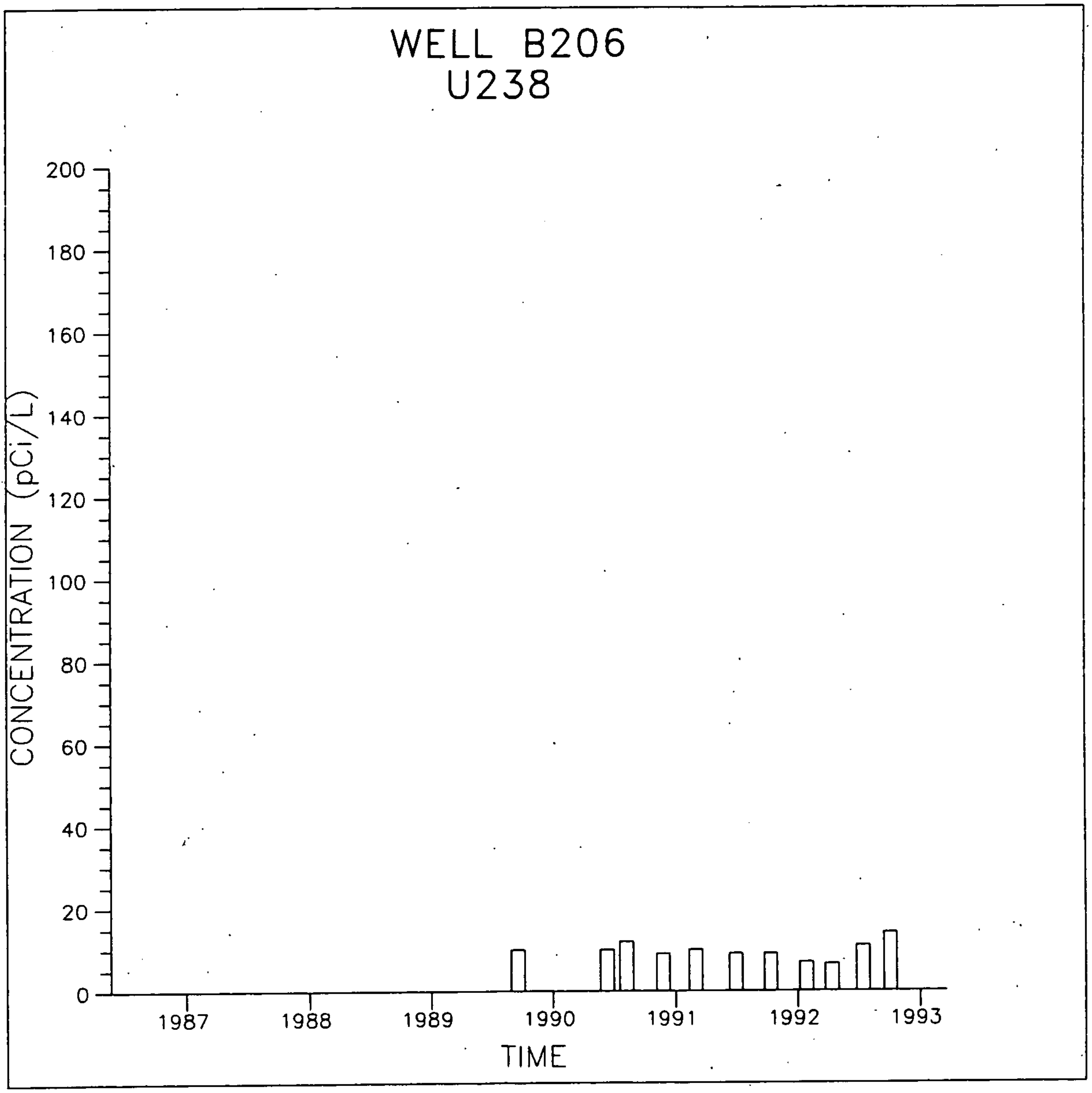
381

381

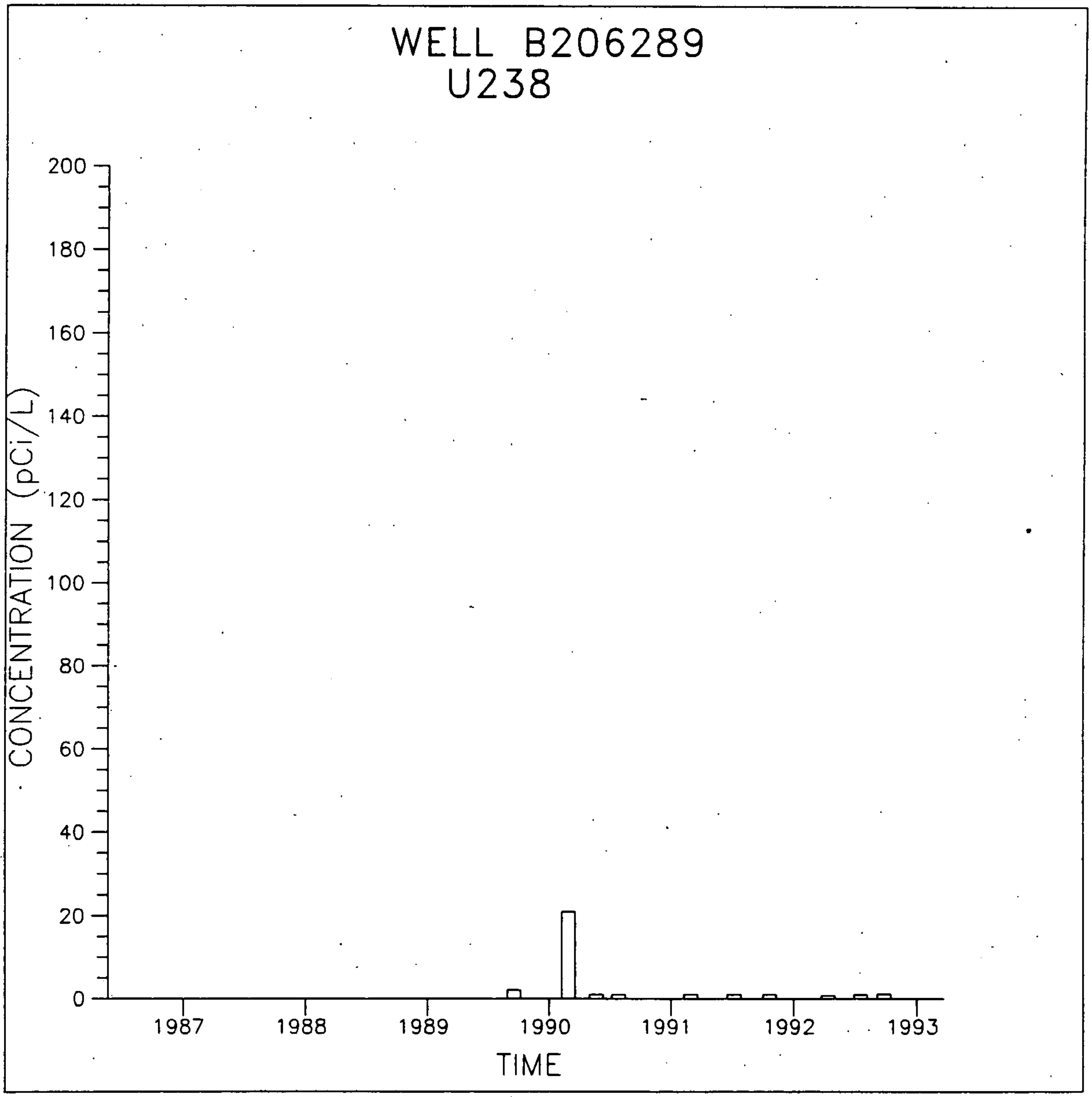

WELL B205589
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

382

~~382~~



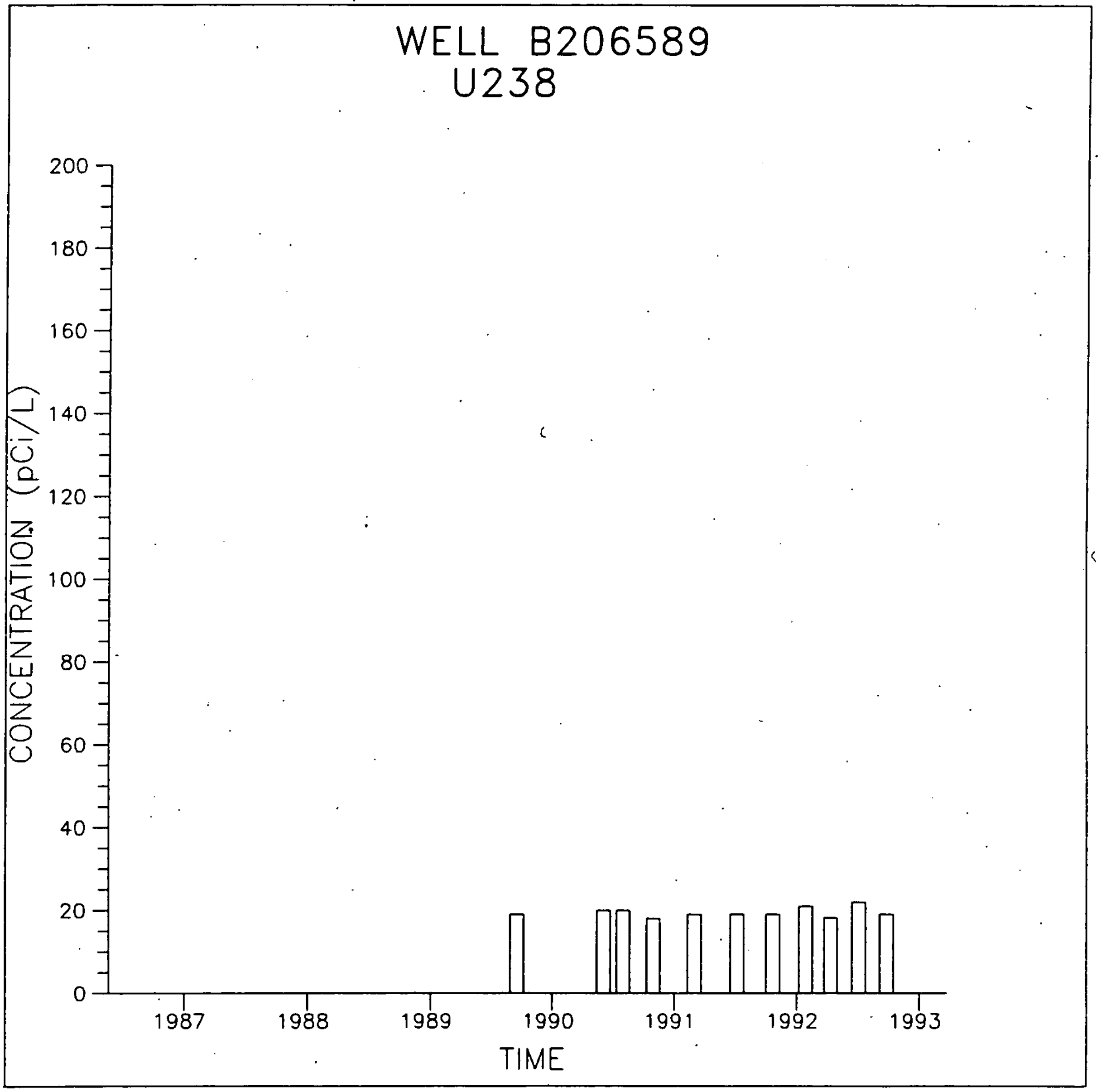
WELL B206
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

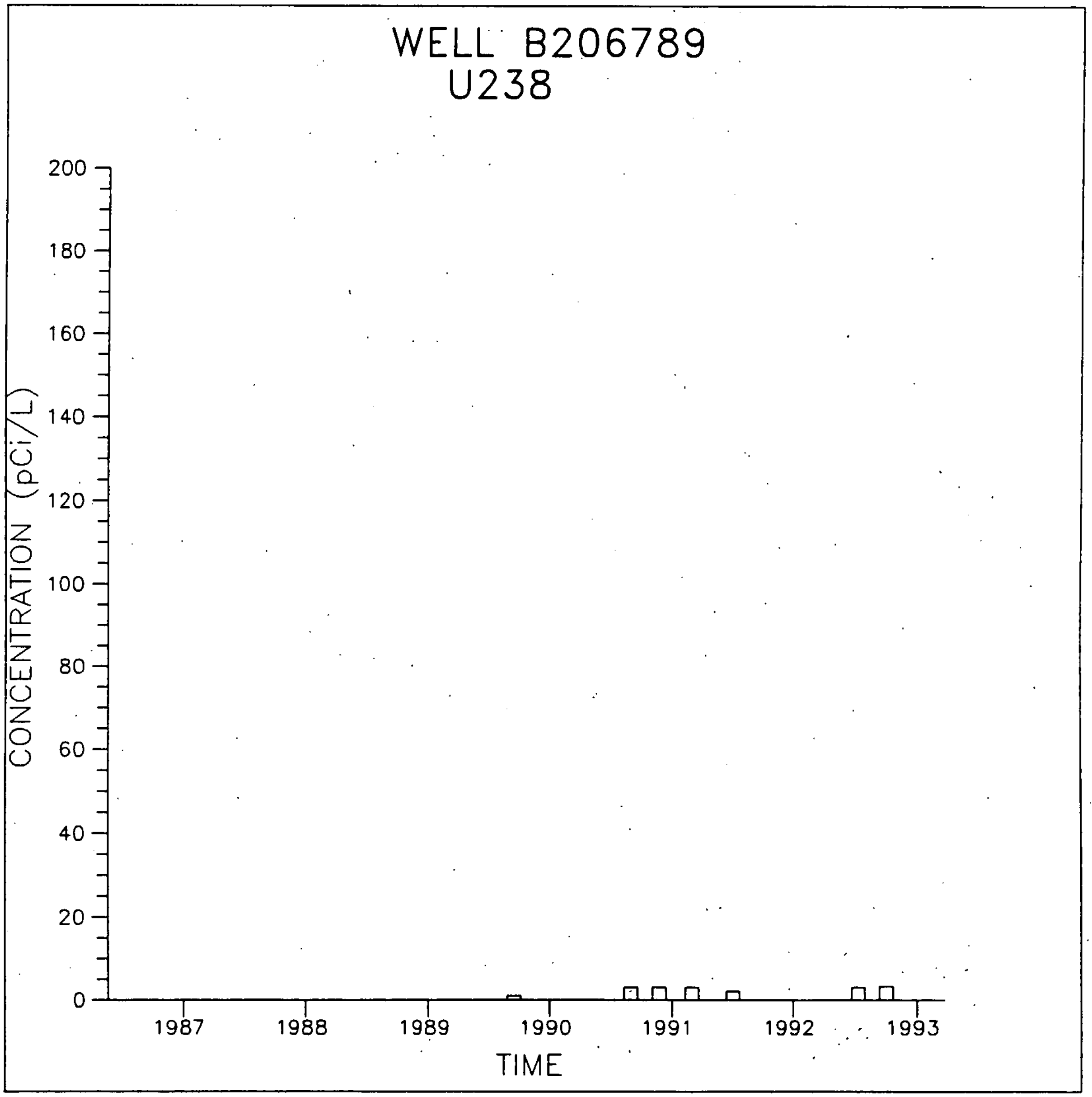


WELL B206289
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

384

384

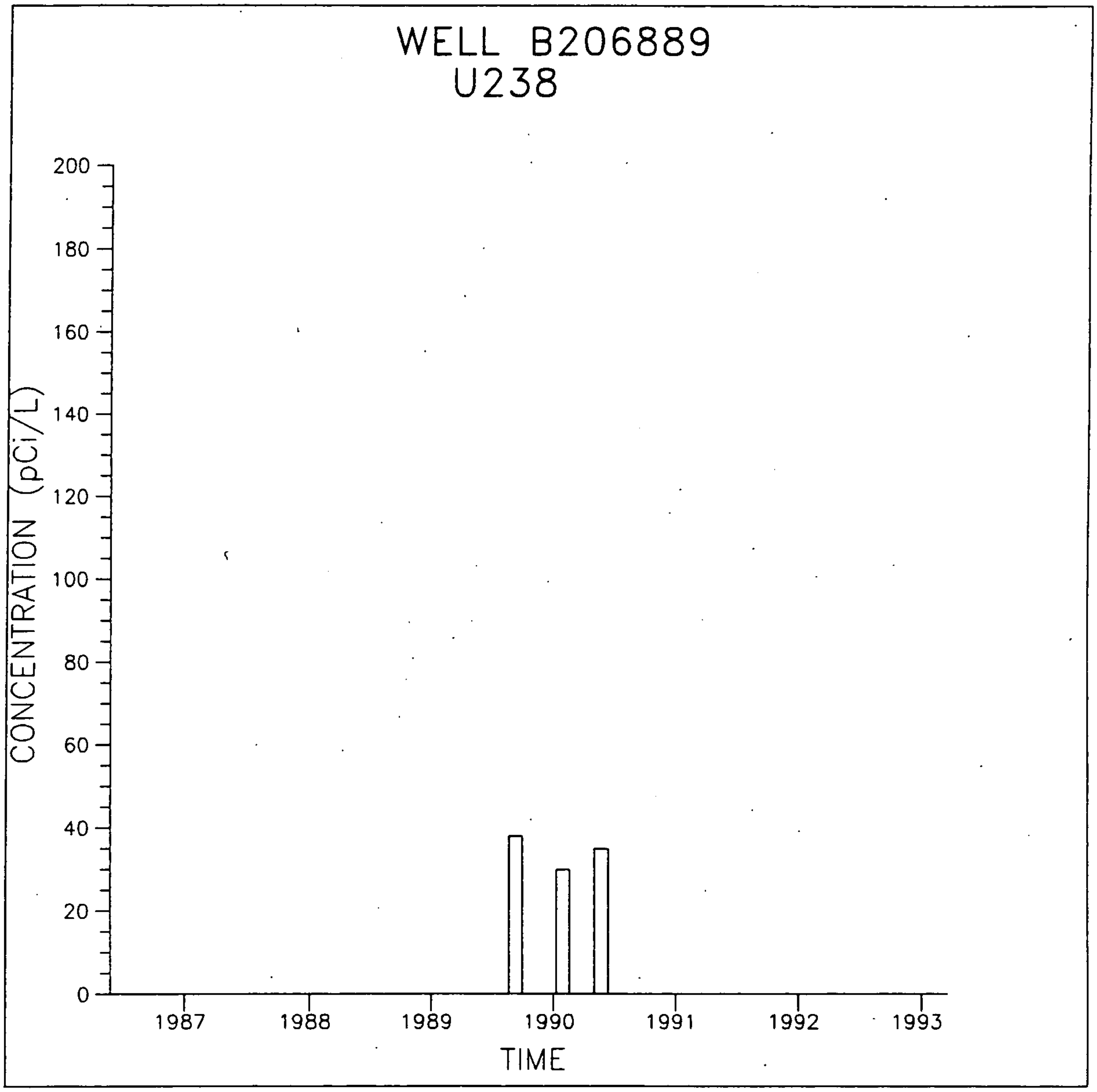

WELL B206589
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME



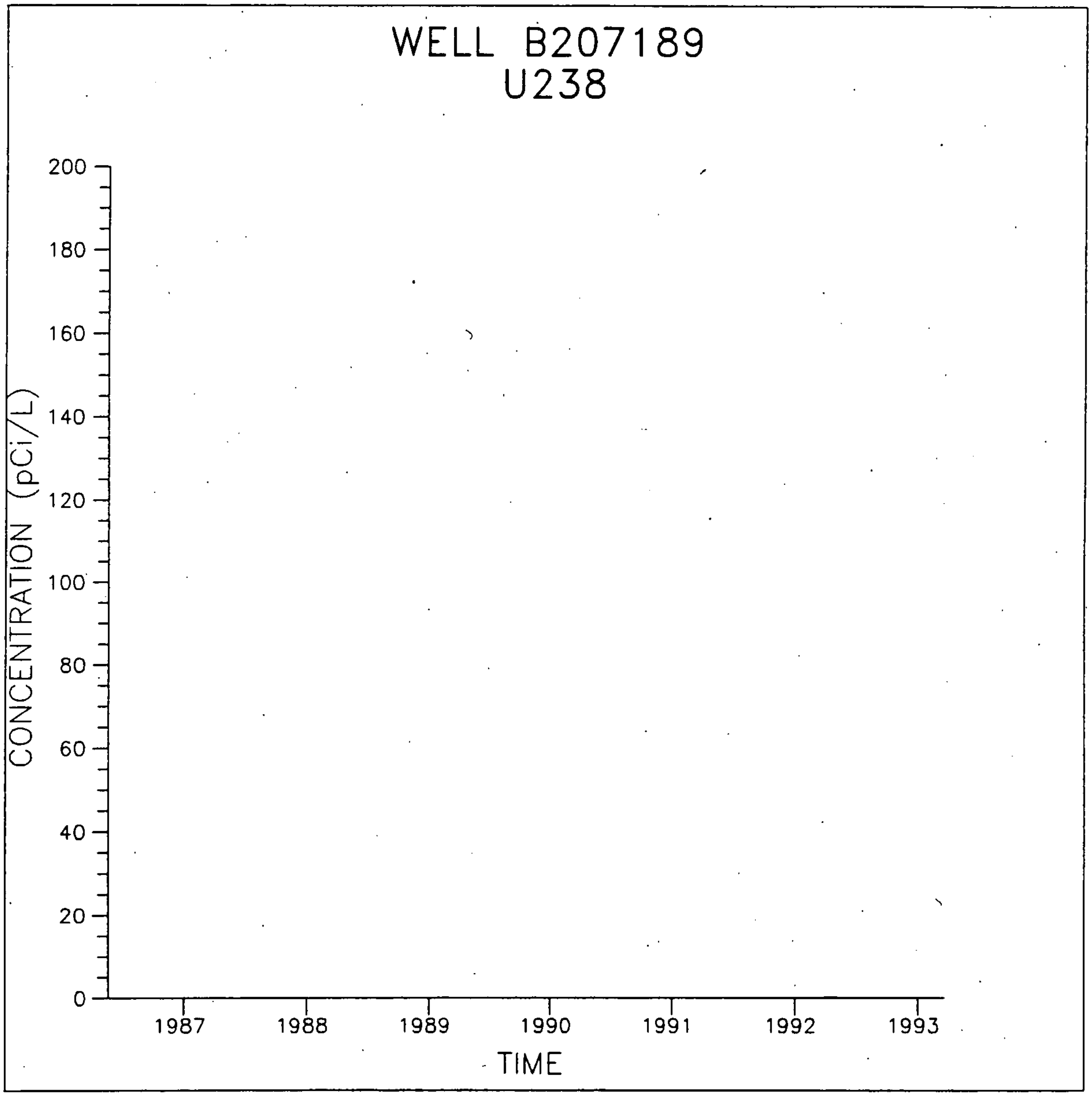
WELL B206789
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

386

386


WELL B206889
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

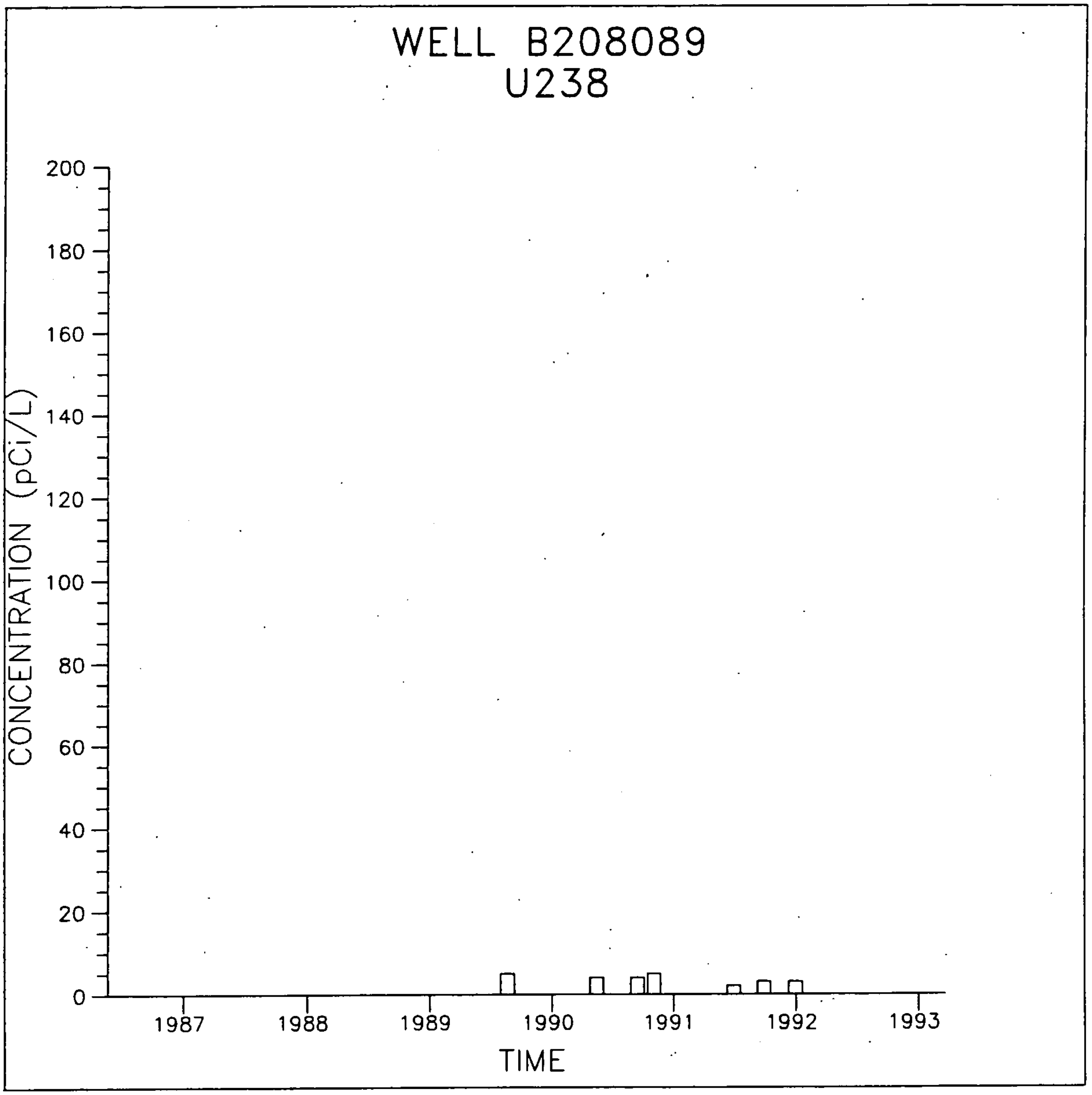
387



WELL B207189
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

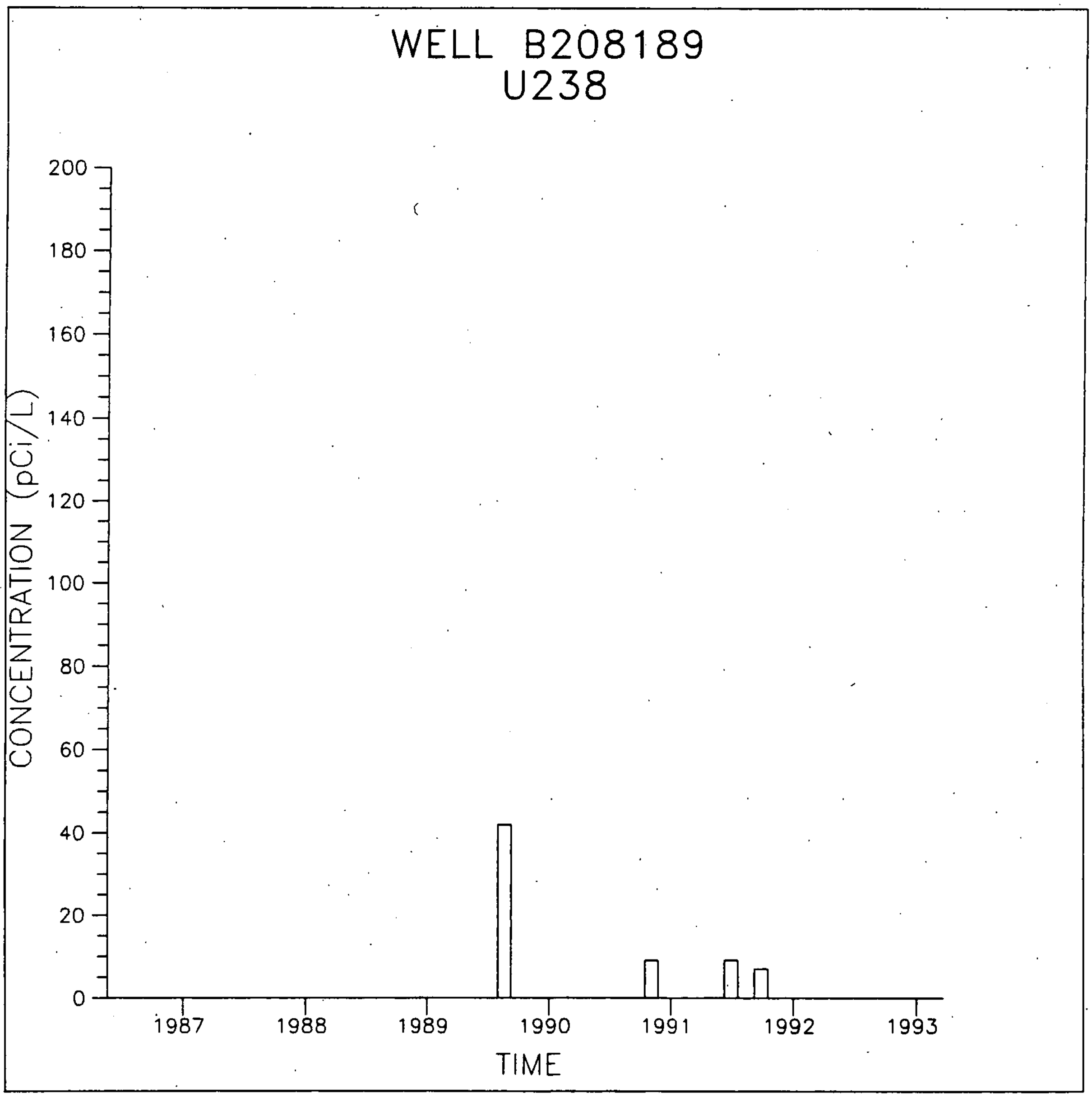
388

388



WELL B208089
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

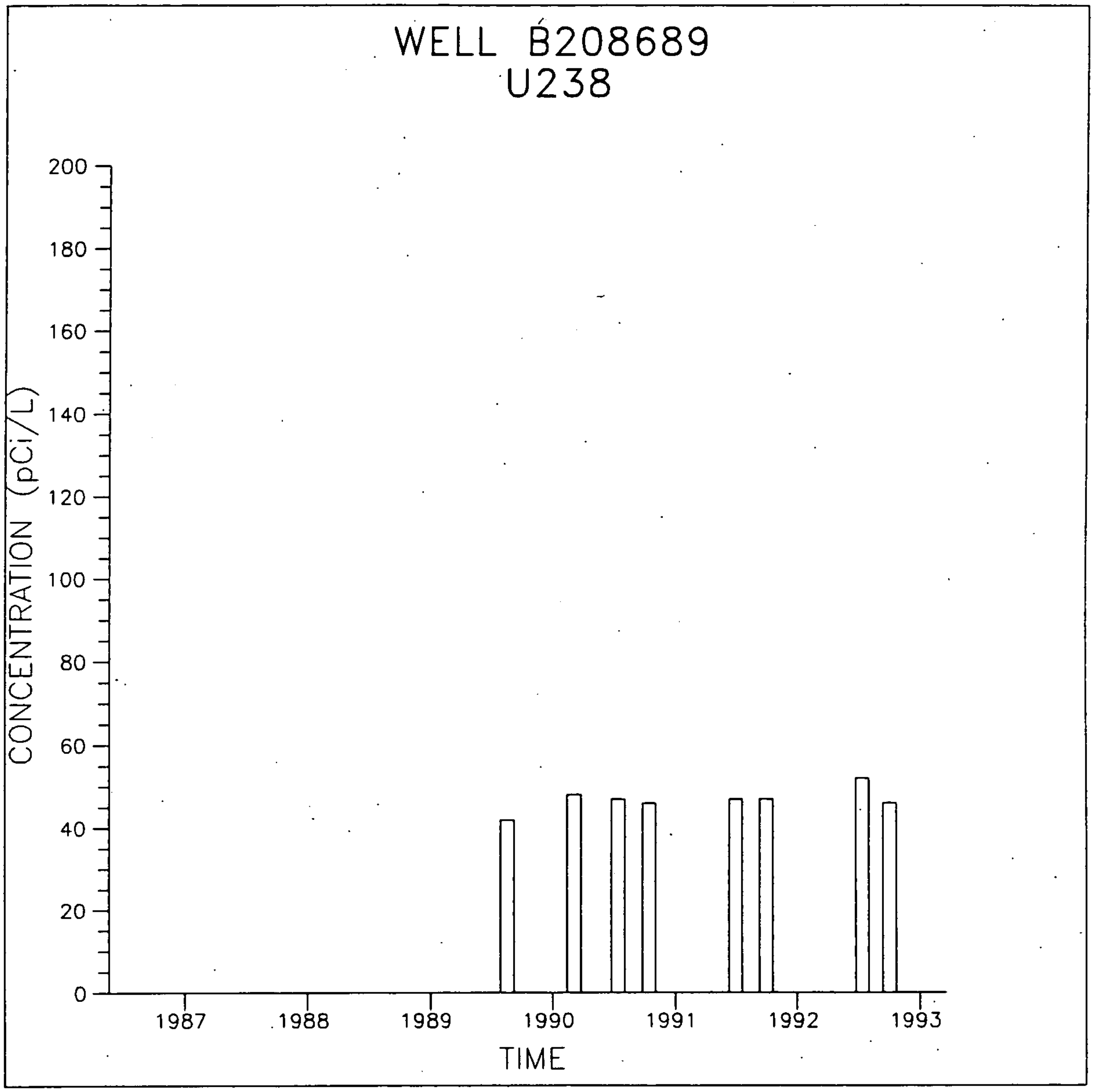
389

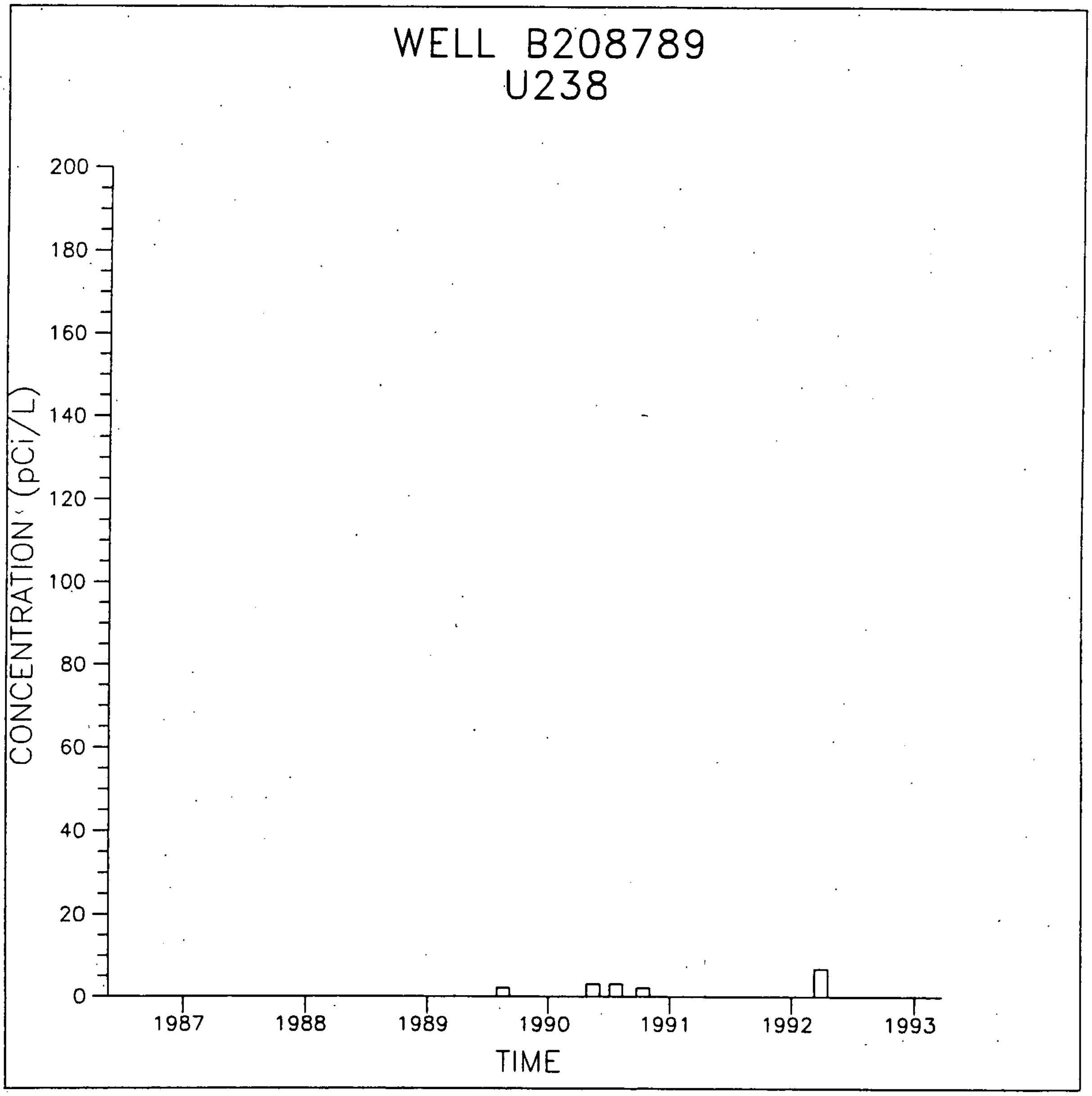


WELL B208189
U238
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (pCi/L)
1987
1988
1989
1990
1991
1992
1993
TIME

390

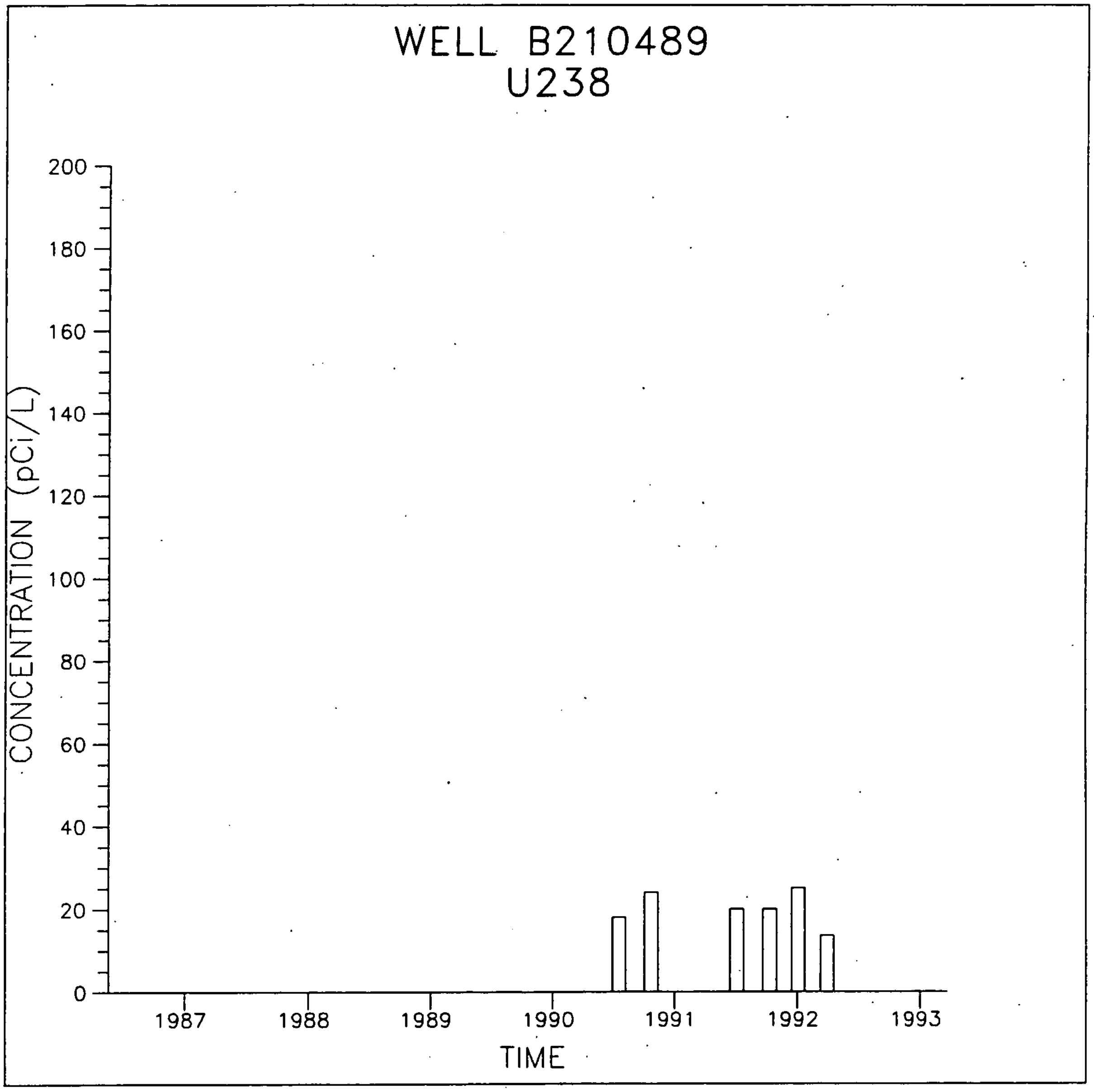
~~390~~ 390


WELL B208689
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME


WELL B208789
U238
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (pCi/L)
1987
1988
1989
1990
1991
1992
1993
TIME

392

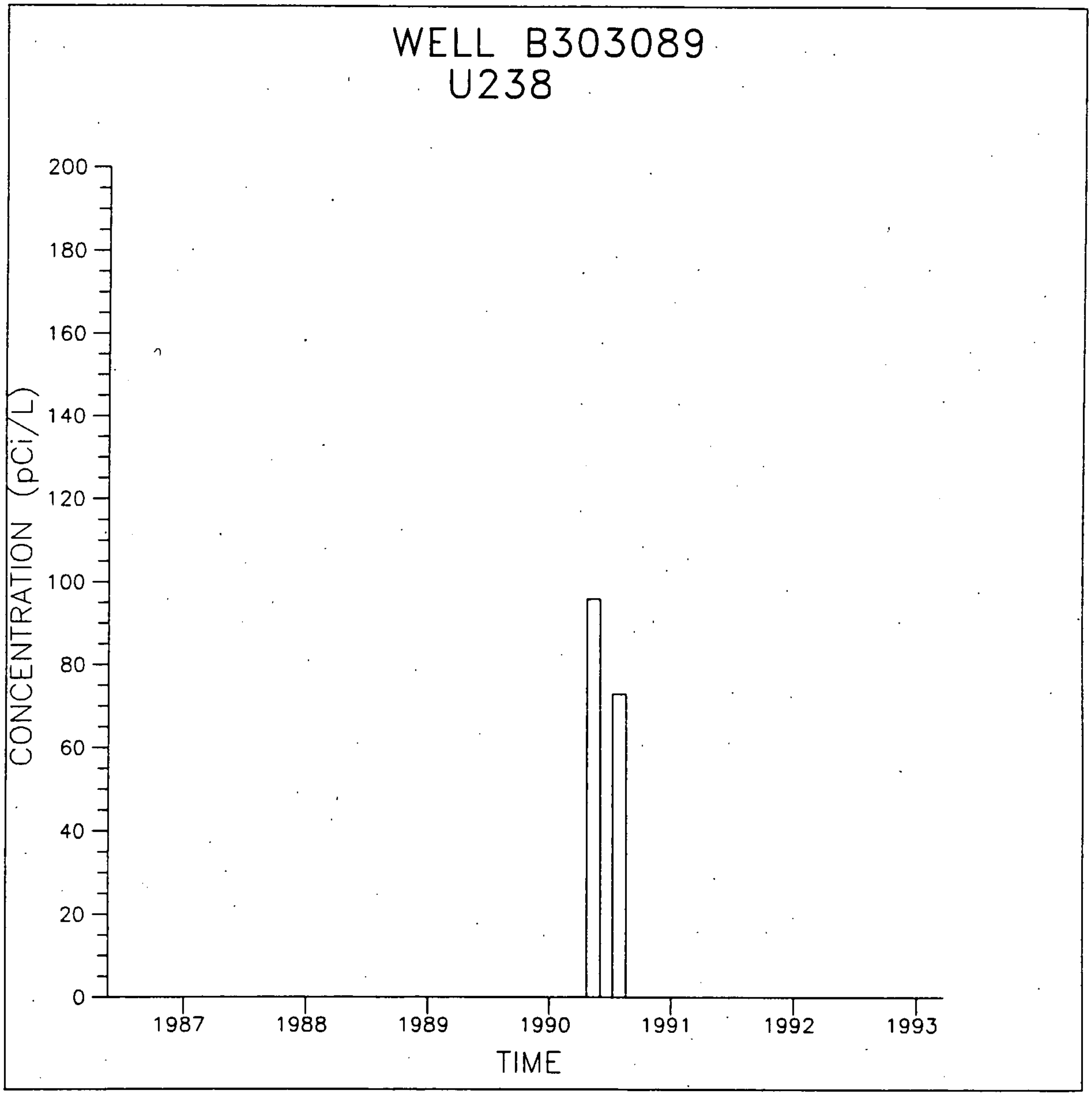
392



WELL B210489
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

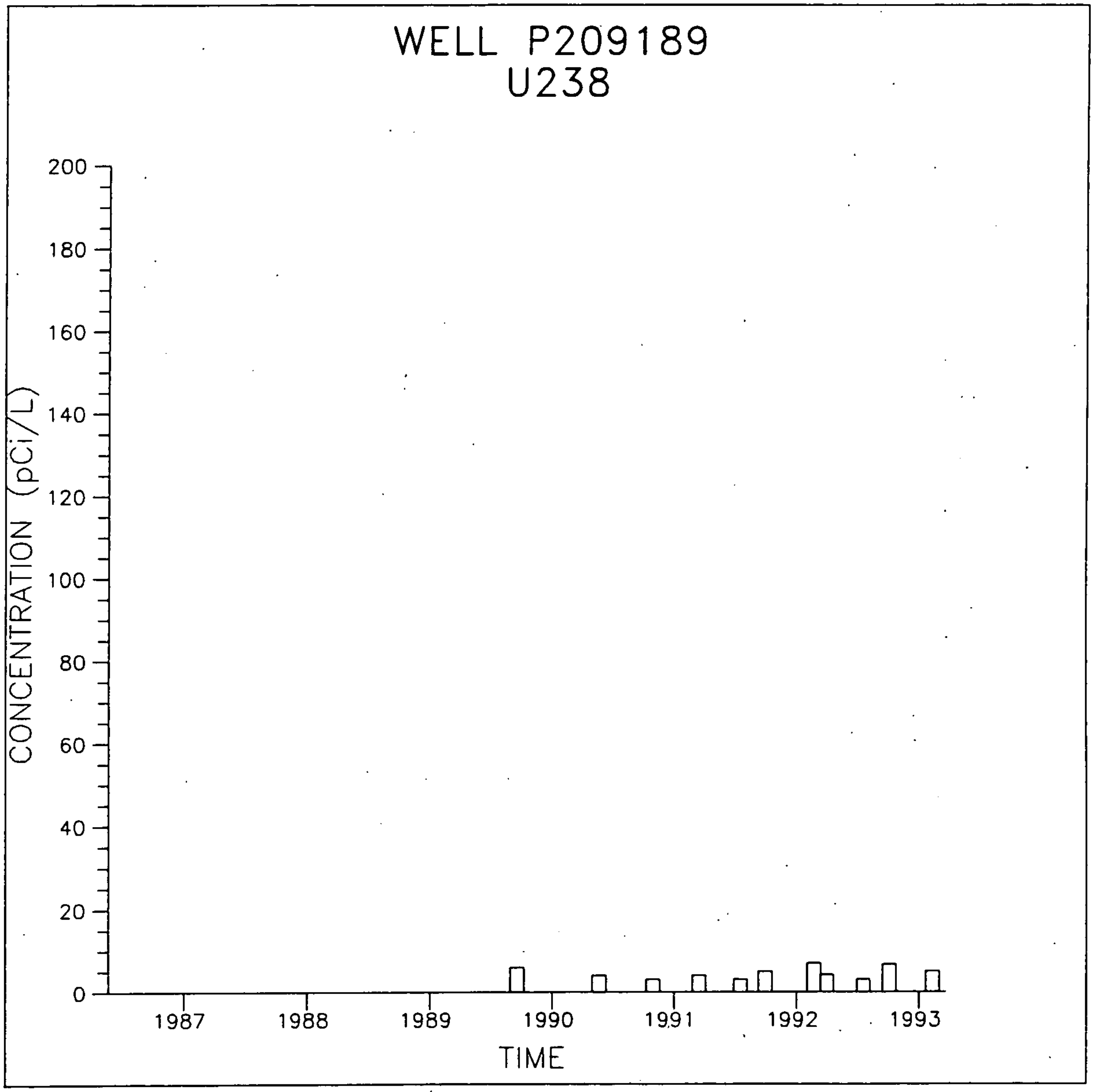
393

393



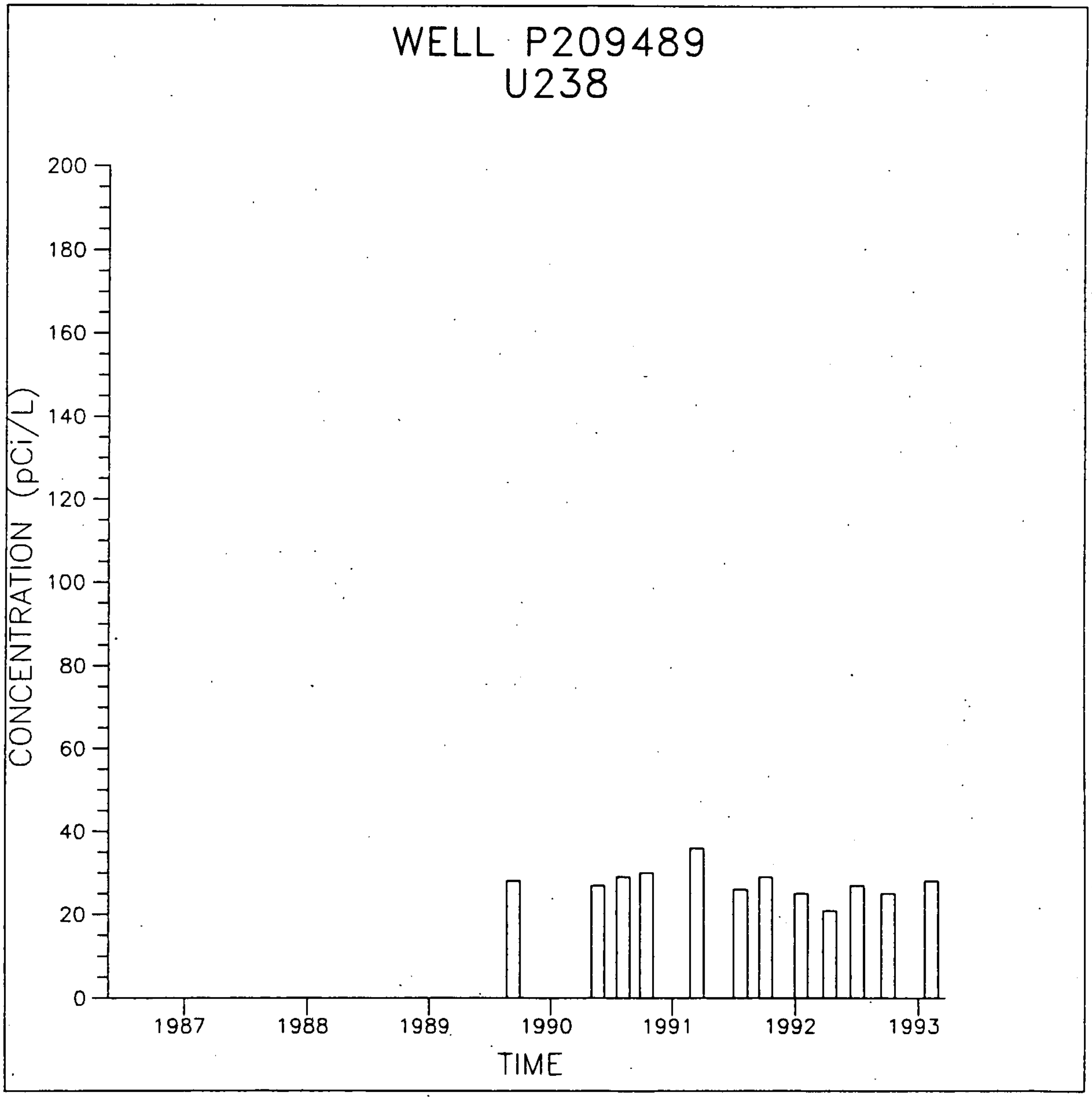
WELL B303089
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

394



WELL P209189
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

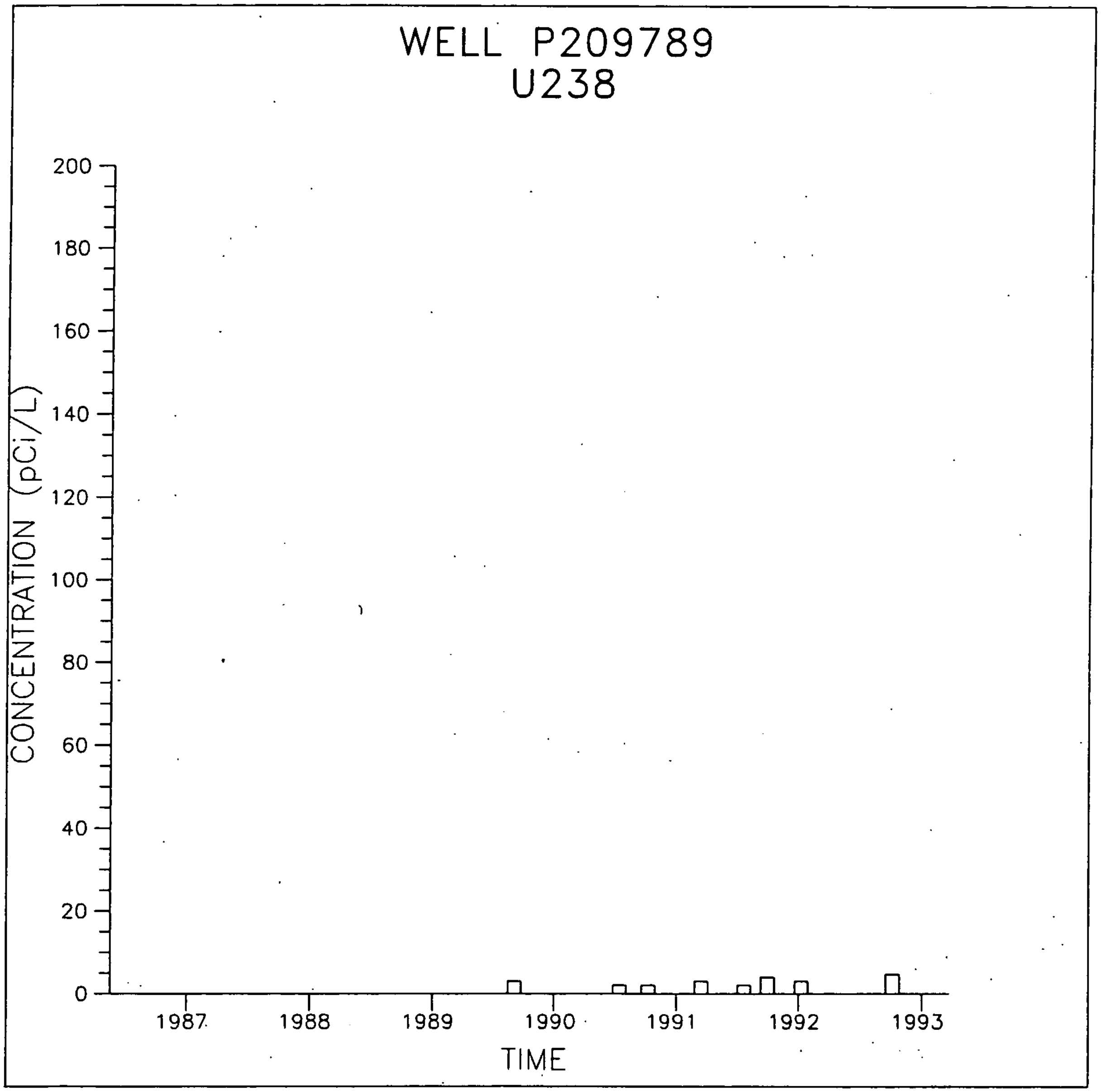
395



WELL P209489
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

394

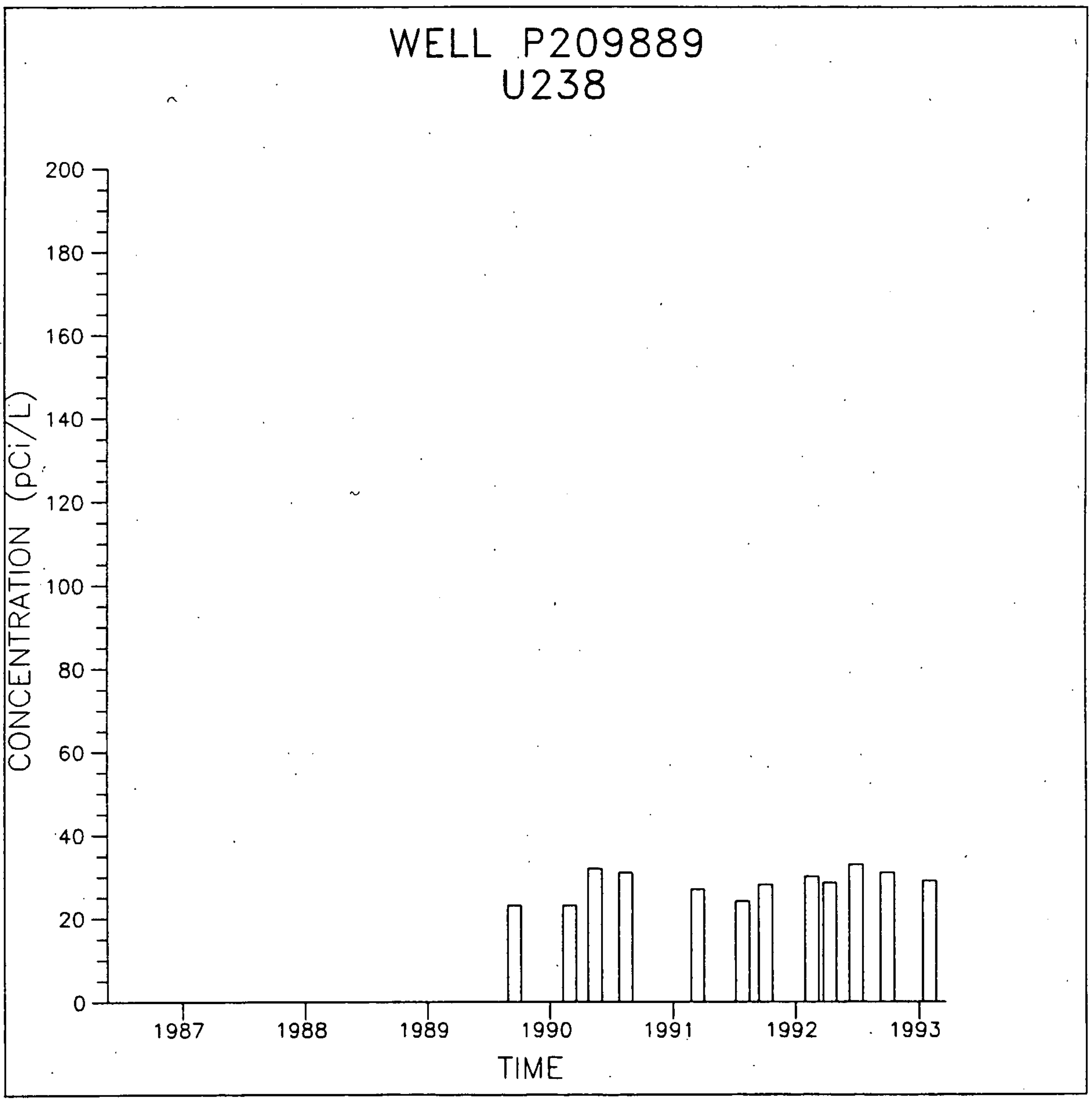
~~396~~



WELL P209789
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

397

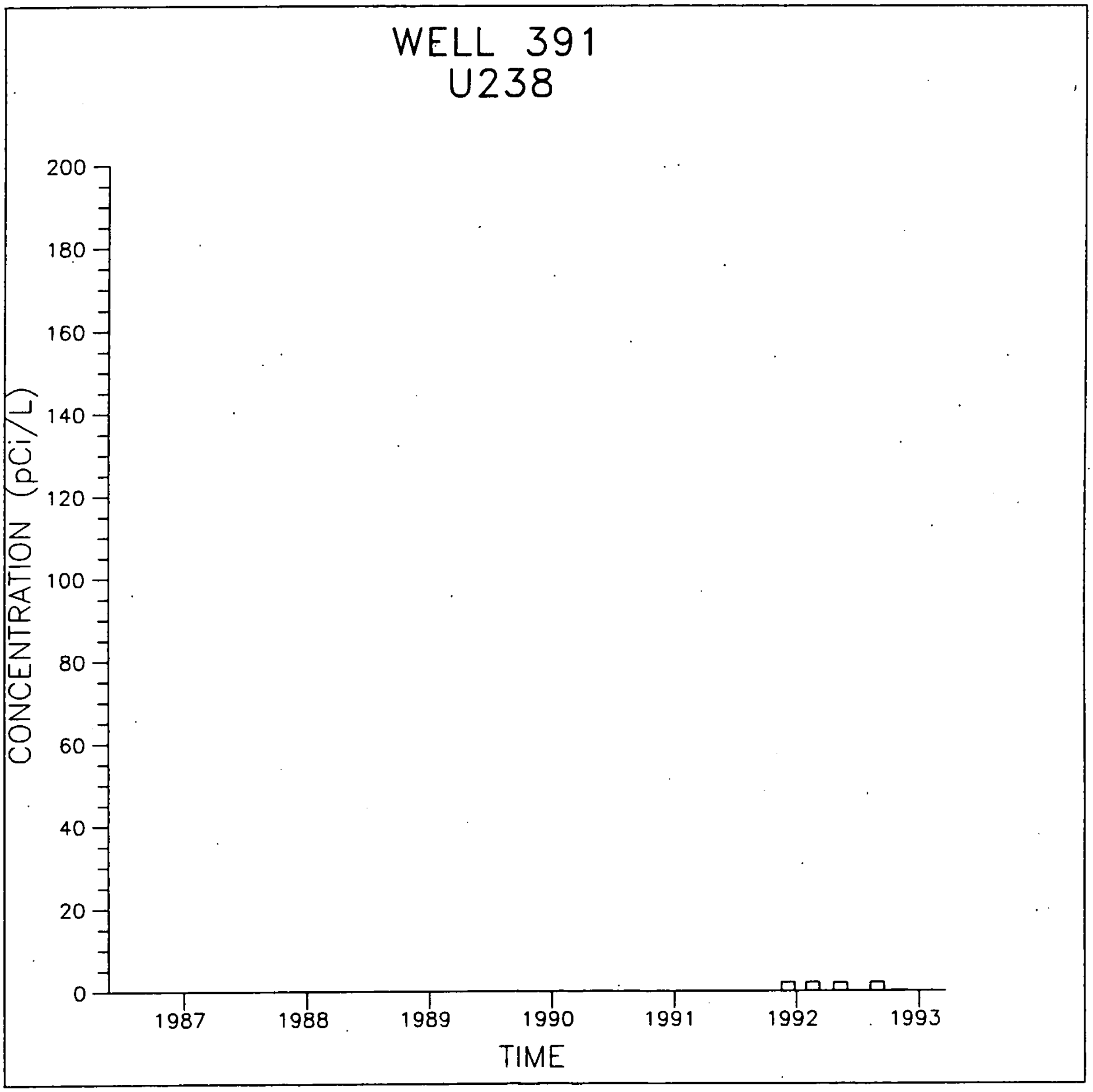
397



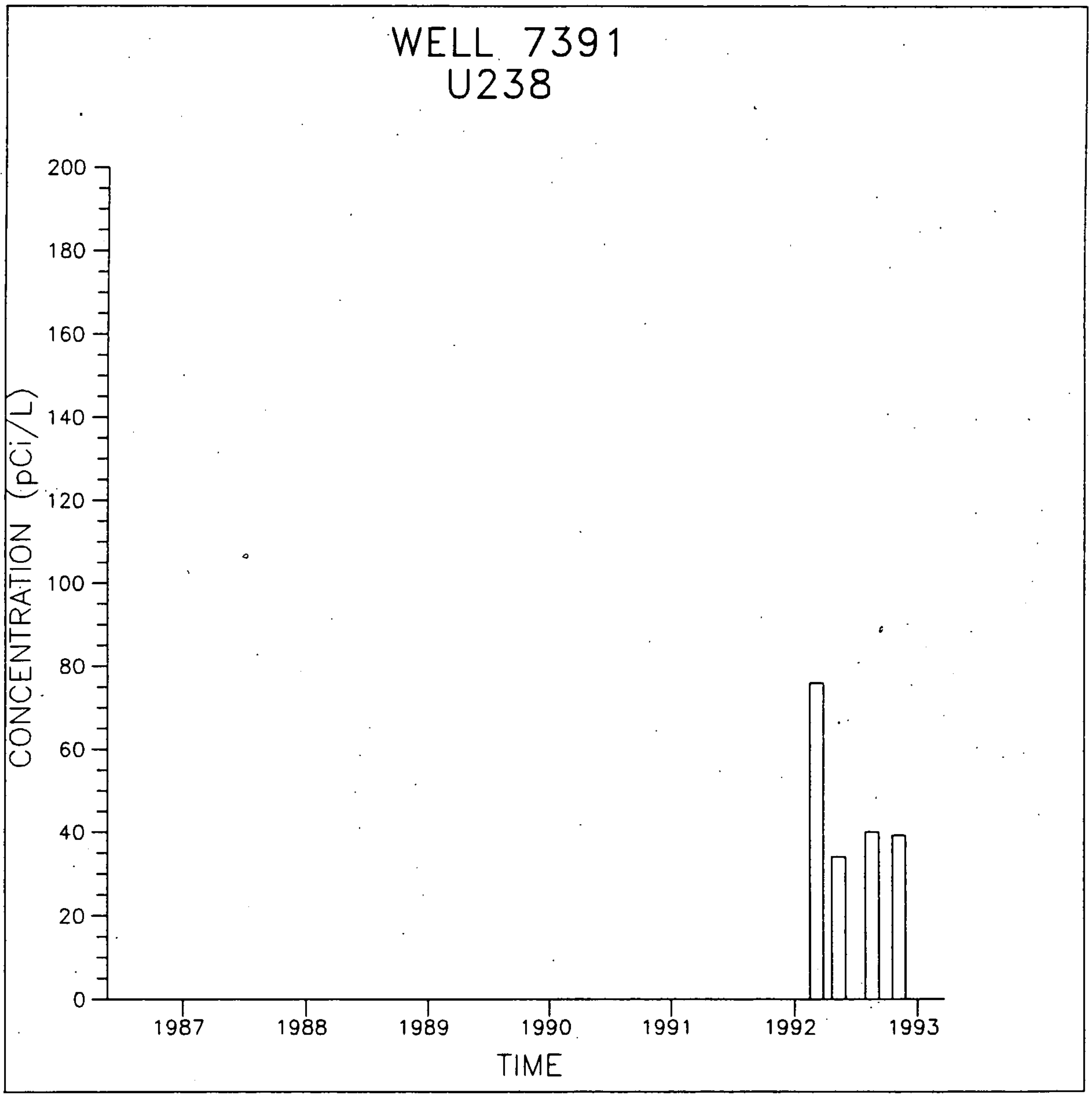
WELL P209889
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

398

398


WELL 391
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

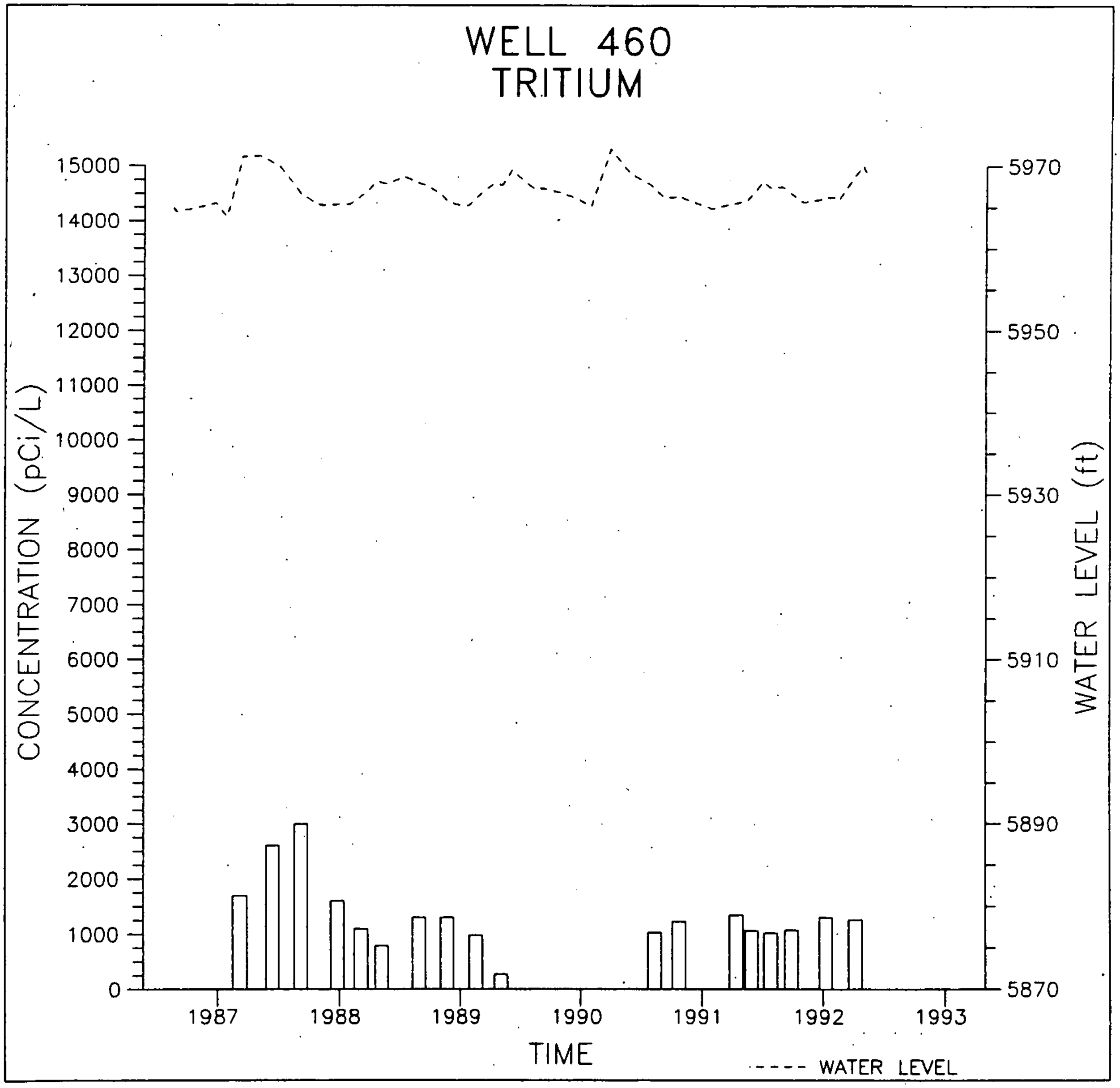
399



WELL 7391
U238
CONCENTRATION (pCi/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

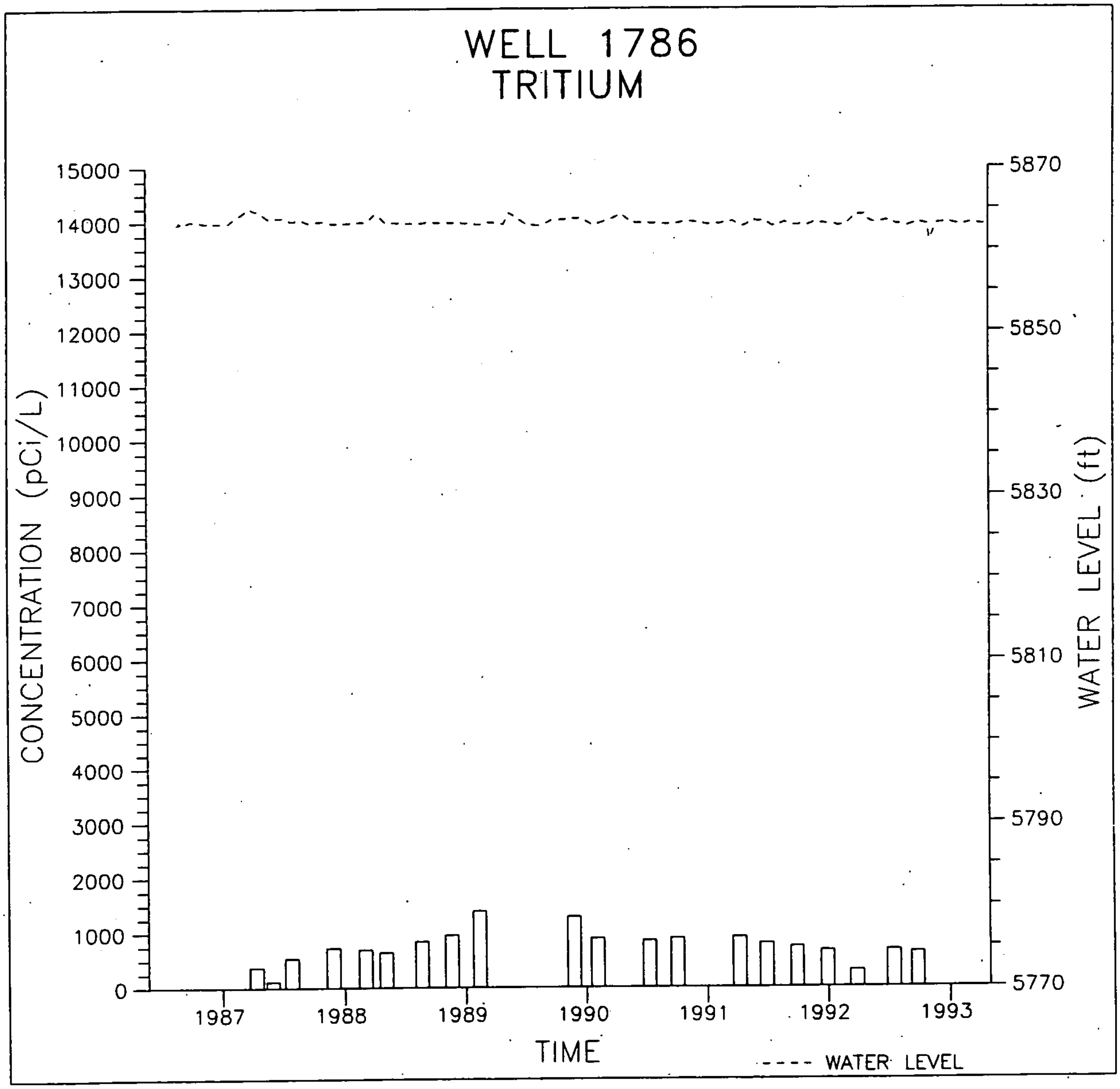
400

400


WELL 460
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

401

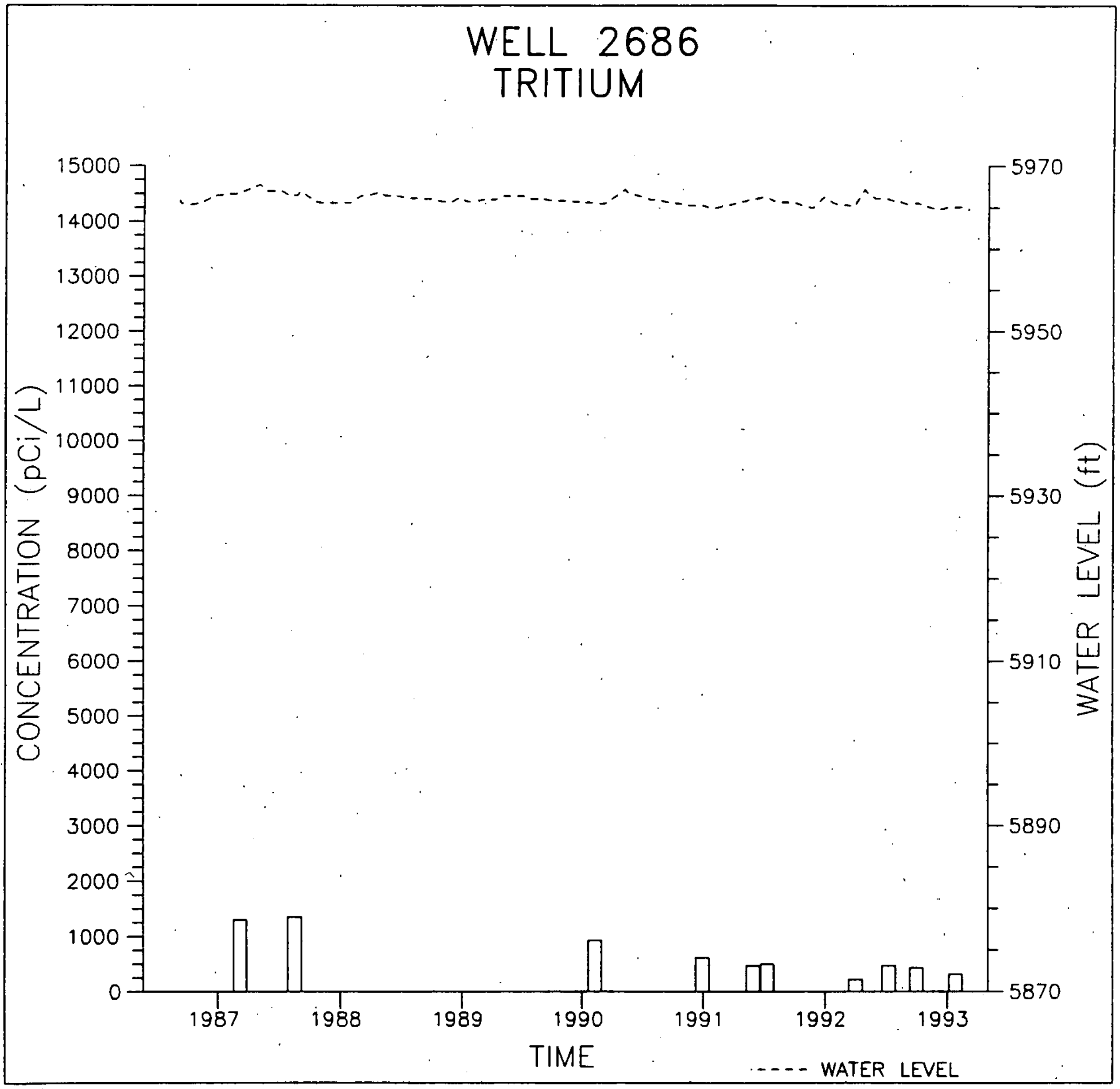
#07



WELL 1786
TRITIUM
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

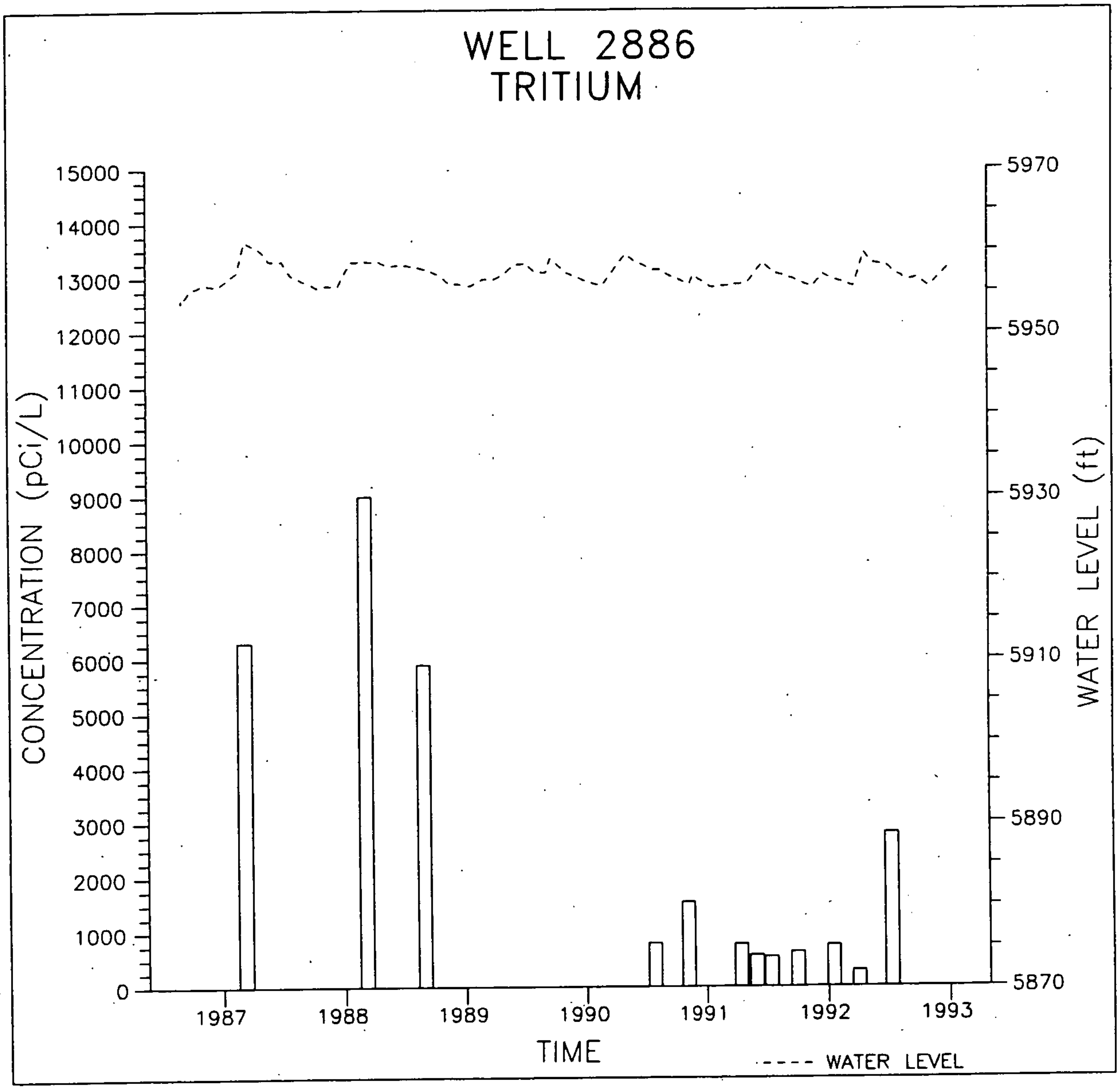
402

403



WELL 2686
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

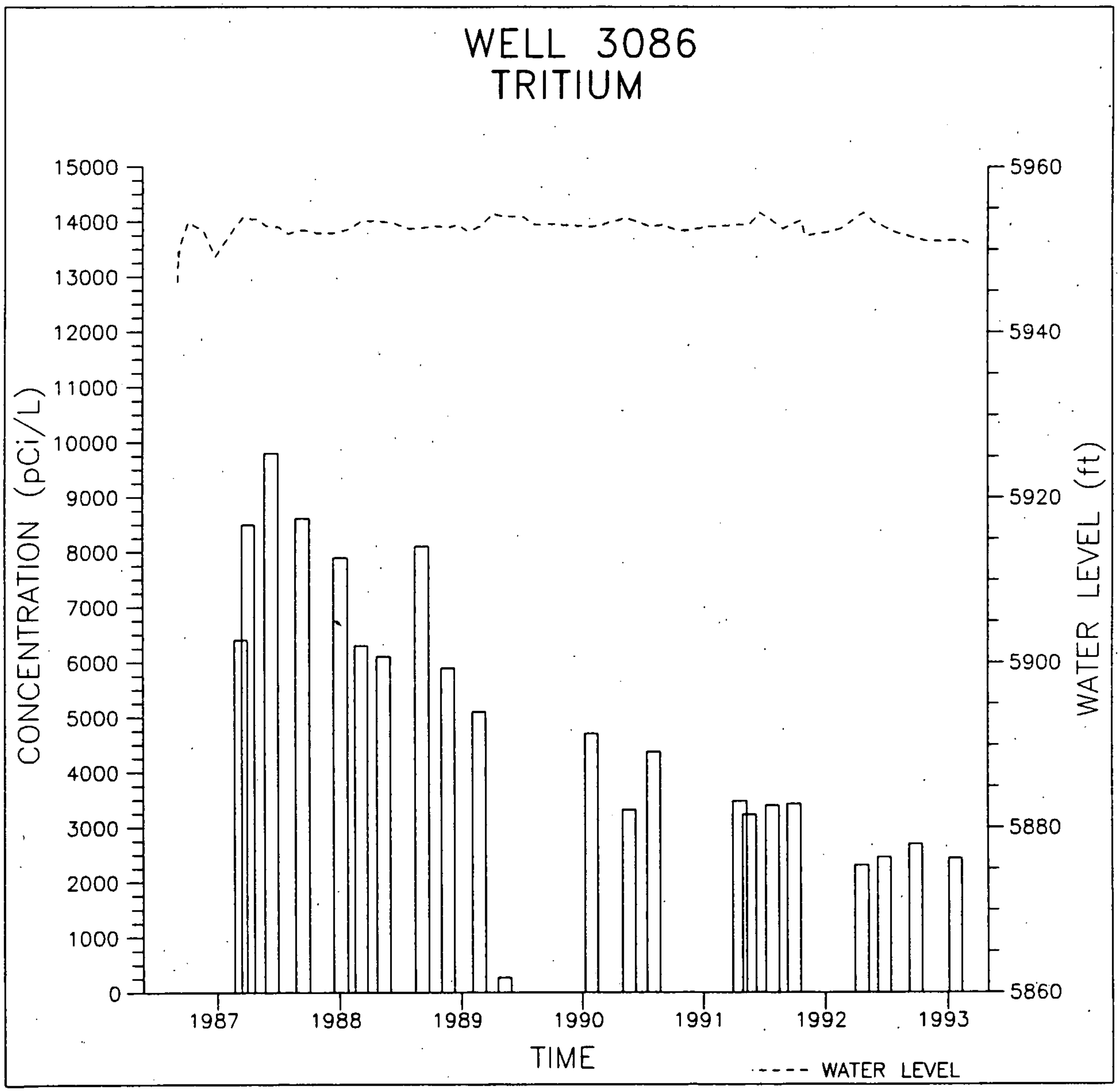
~~403~~ 403



WELL 2886
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

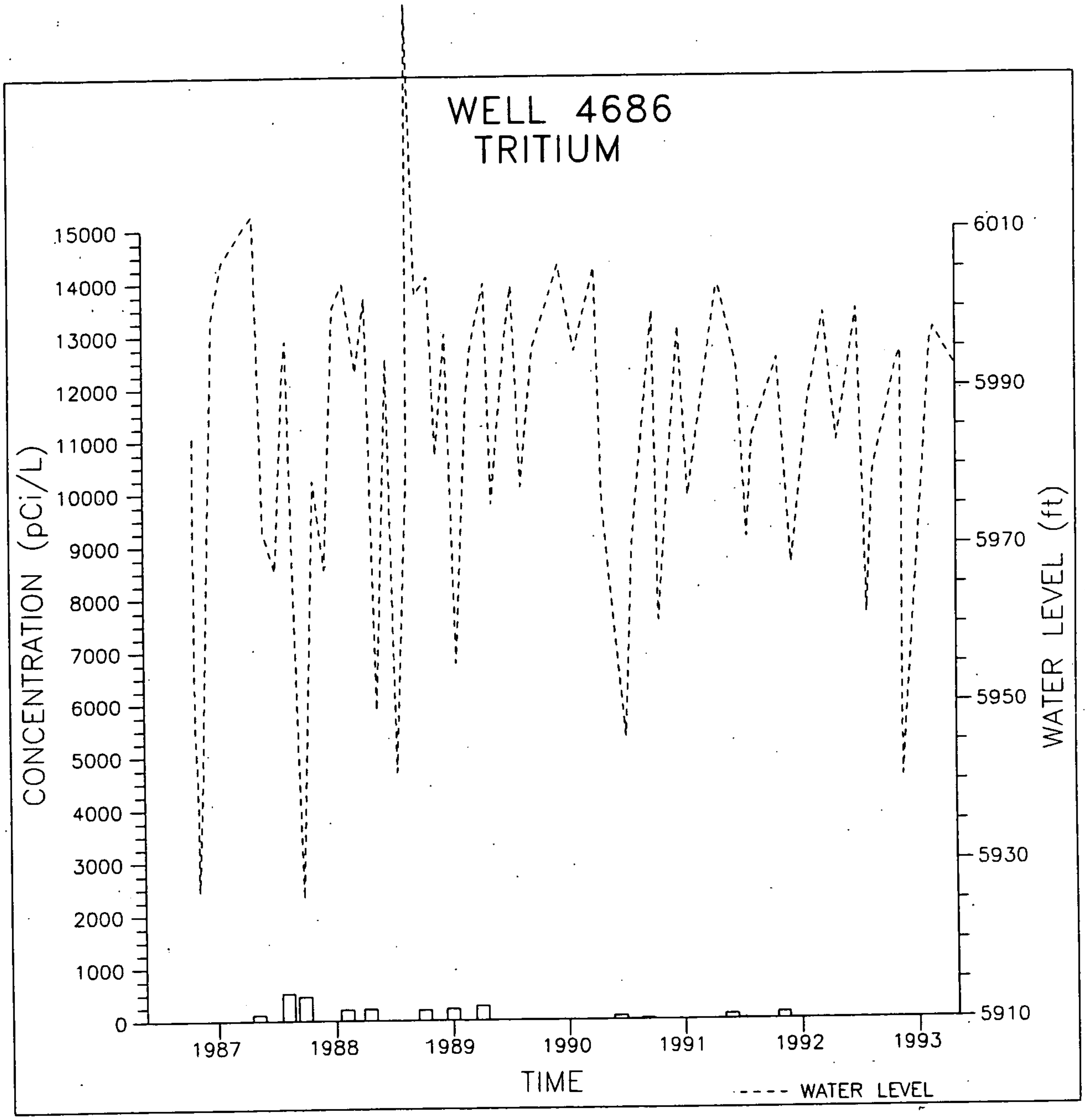
404

455



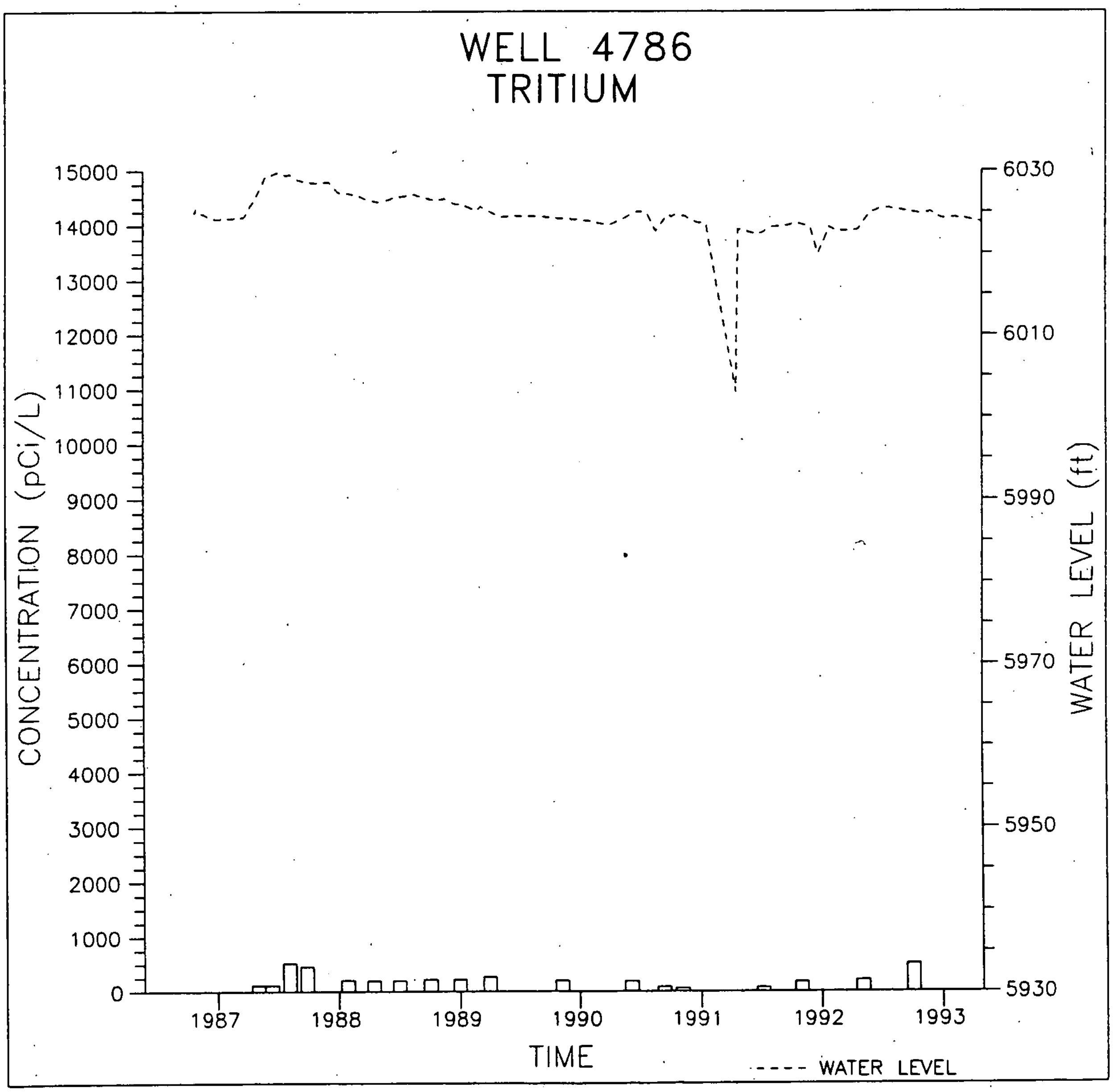
WELL 3086
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5960
5940
5920
5900
5880
5860
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

405


WELL 4686
TRITIUM
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
6010
5990
5970
5950
5930
5910
1987
1988
1989
1990
1991
1992
1993

406

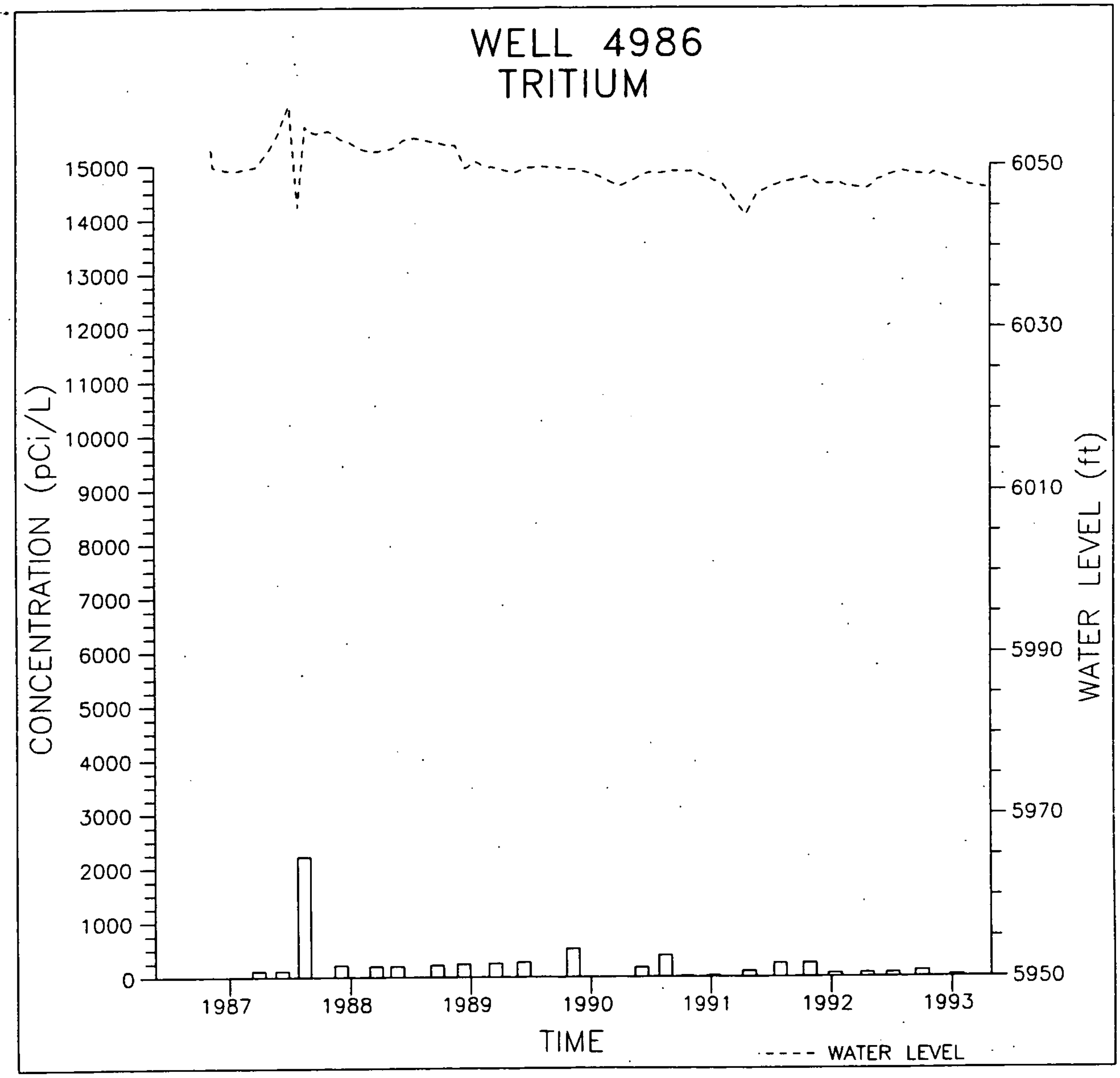
407



WELL 4786
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
6030
6010
5990
5970
5950
5930
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

407

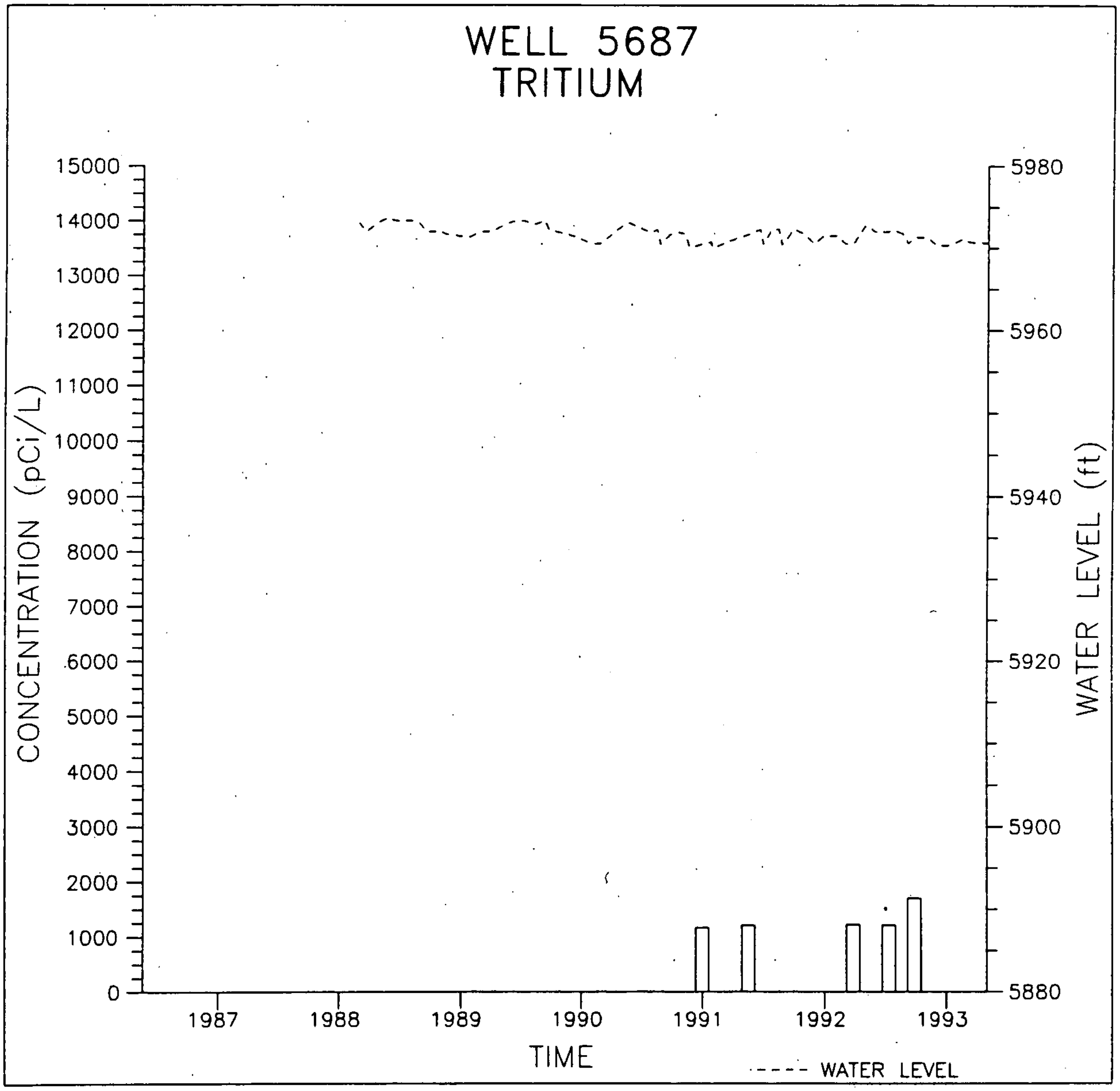
408



WELL 4986
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

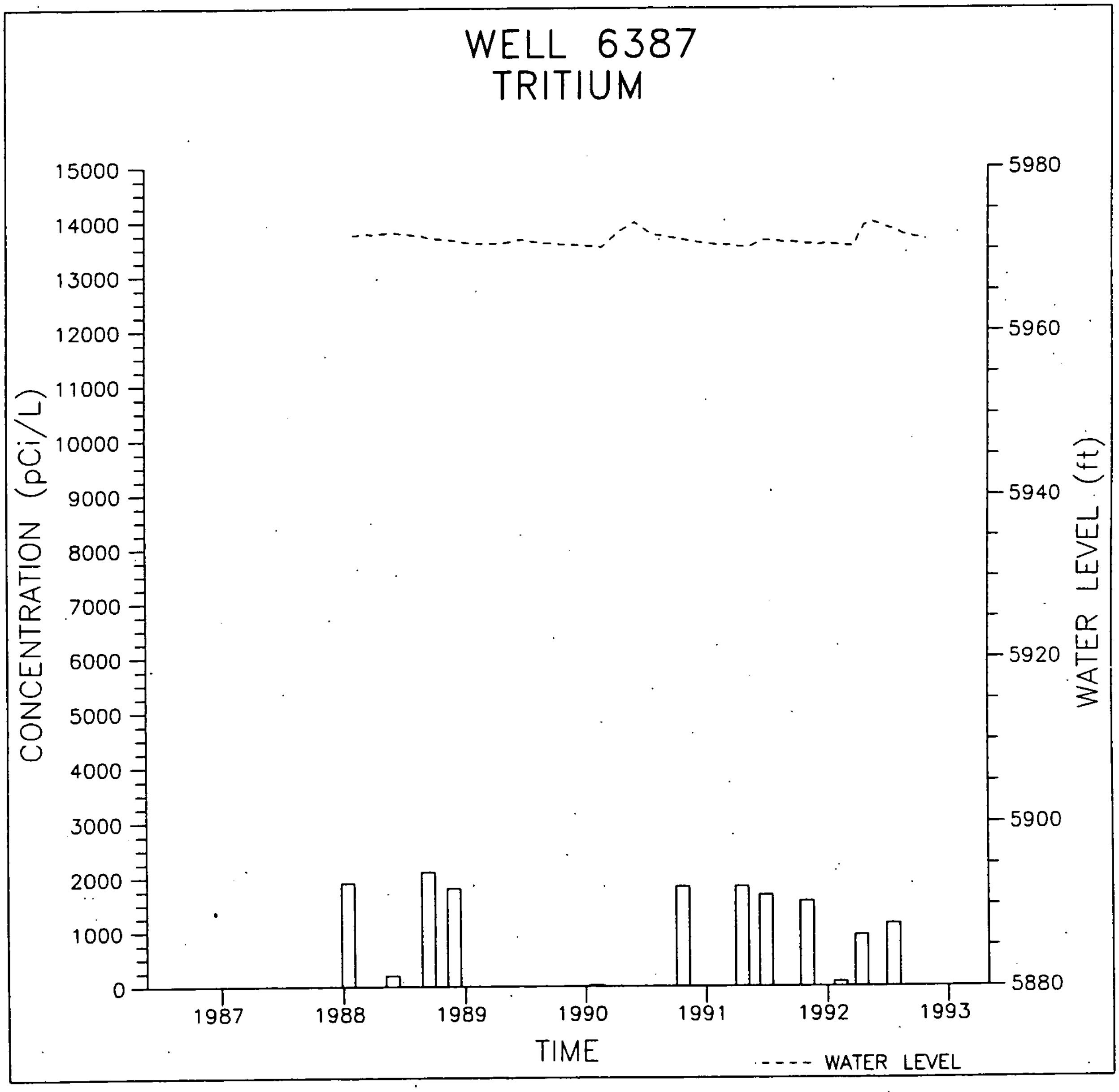
409

408

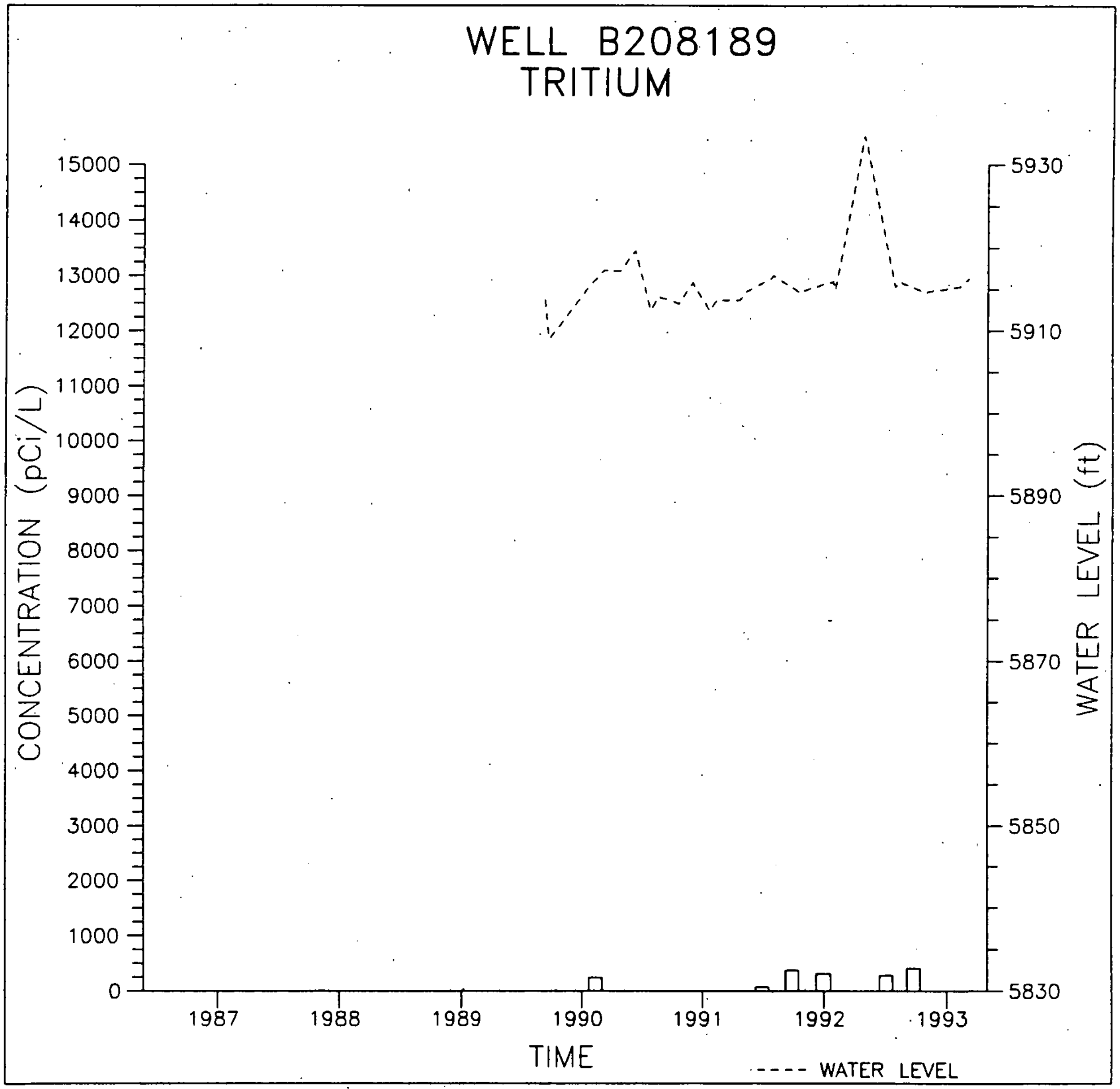

WELL 5687
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

410

409


WELL 6387
TRITIUM
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (pCi/L)
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

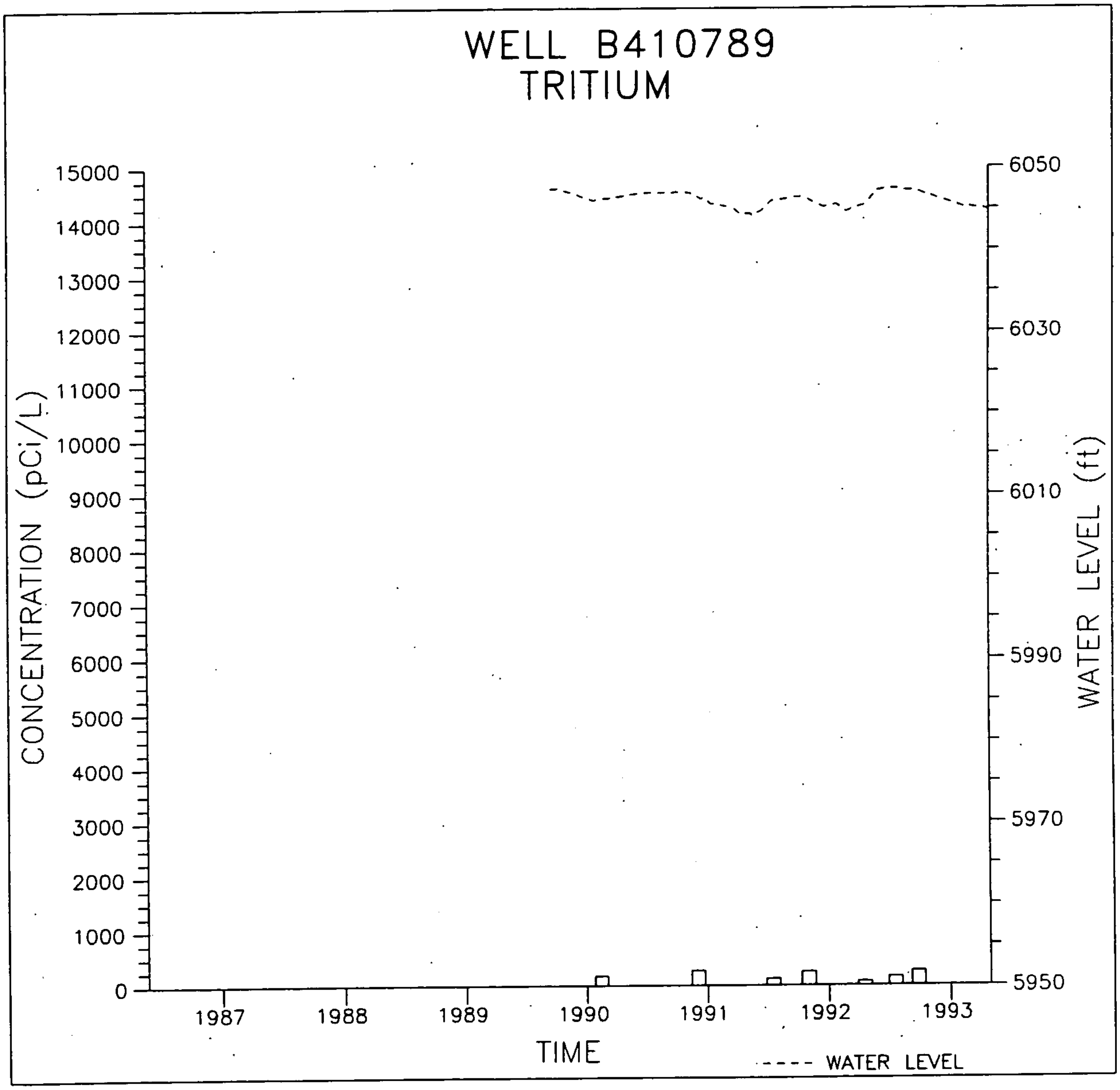
410



WELL B208189
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

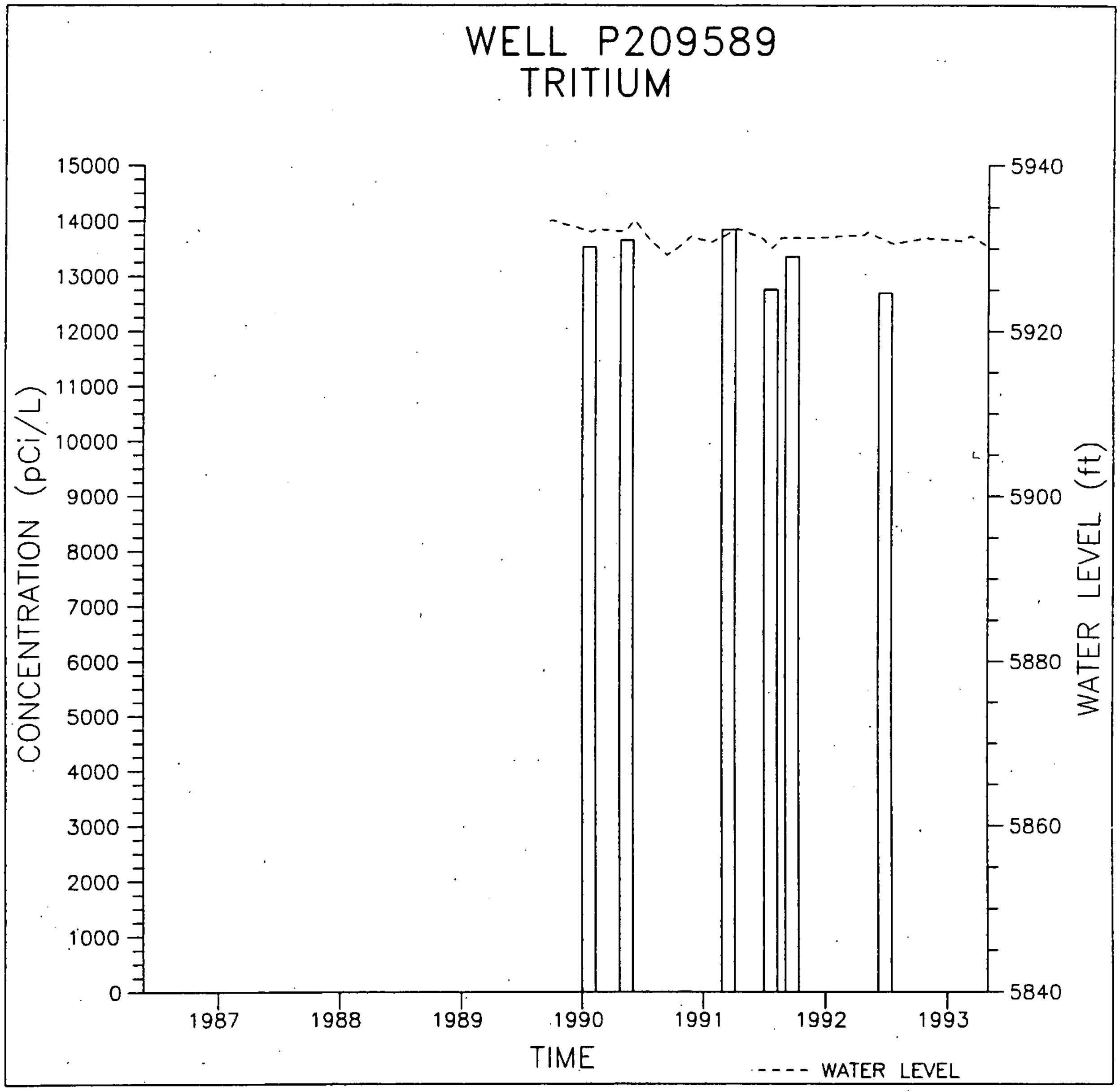
411

#12


WELL B410789
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

412

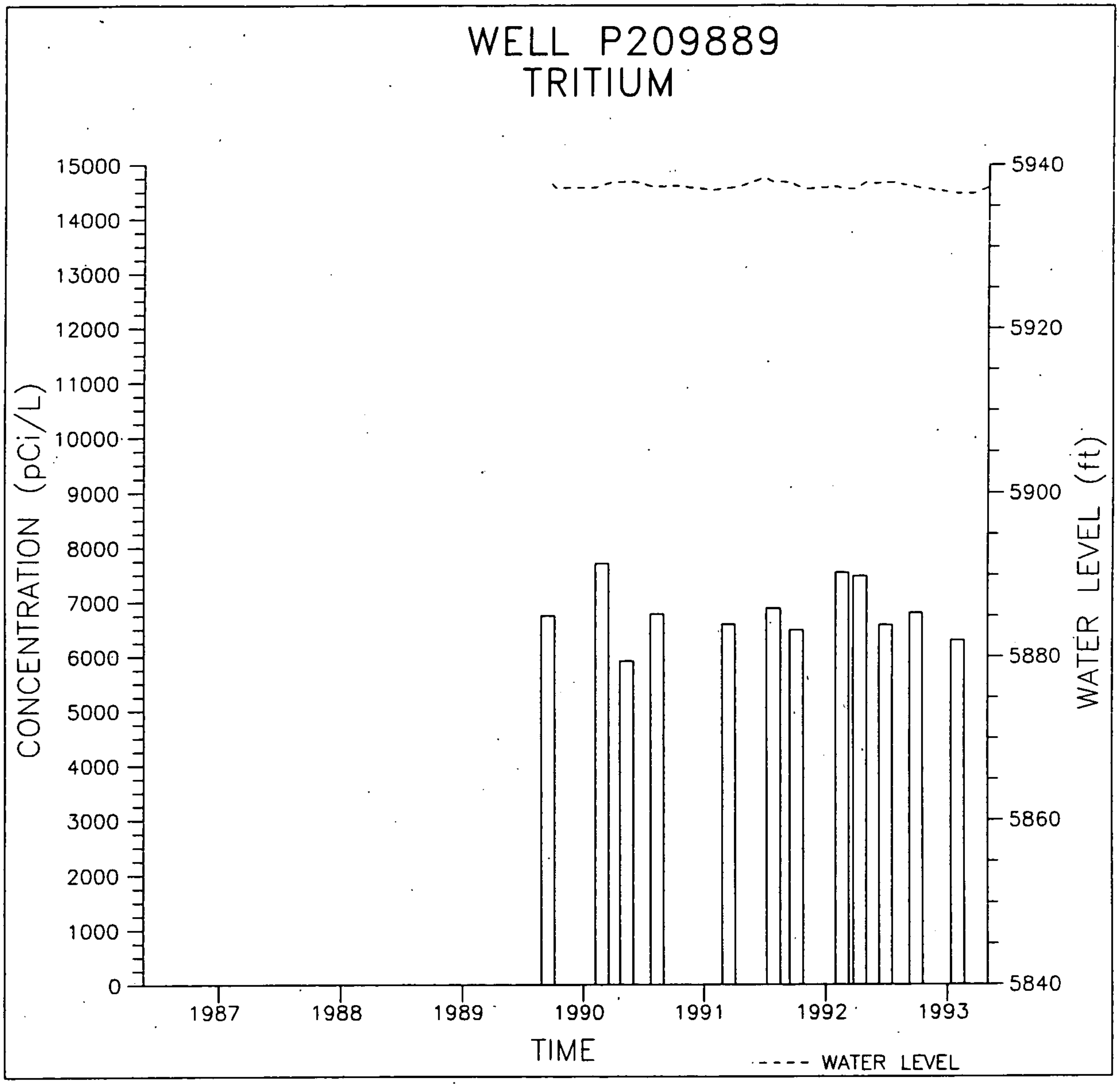
413



WELL P209589
TRITIUM
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (pCi/L)
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

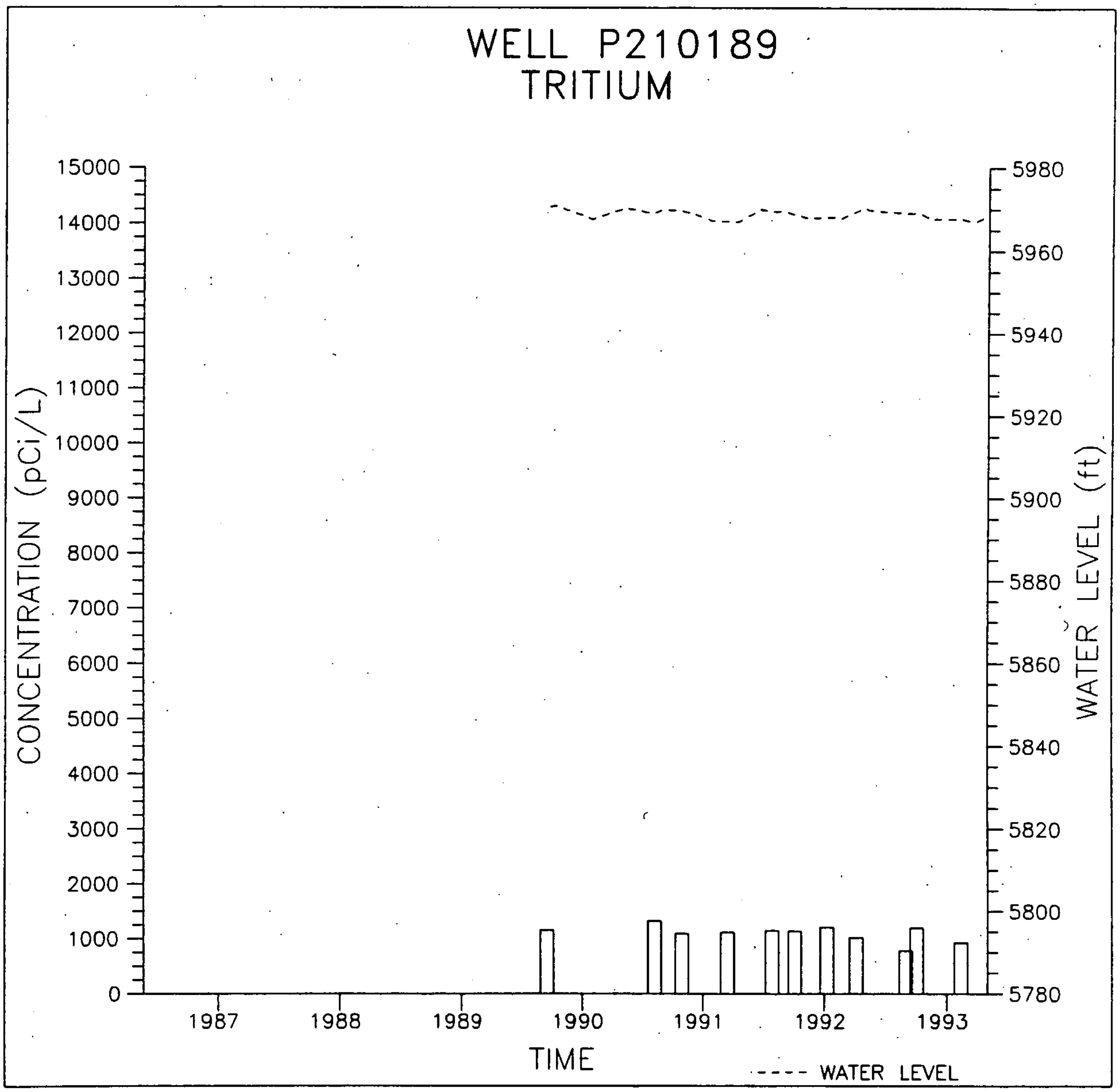
444

413


WELL P209889
TRITIUM
CONCENTRATION (pCi/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

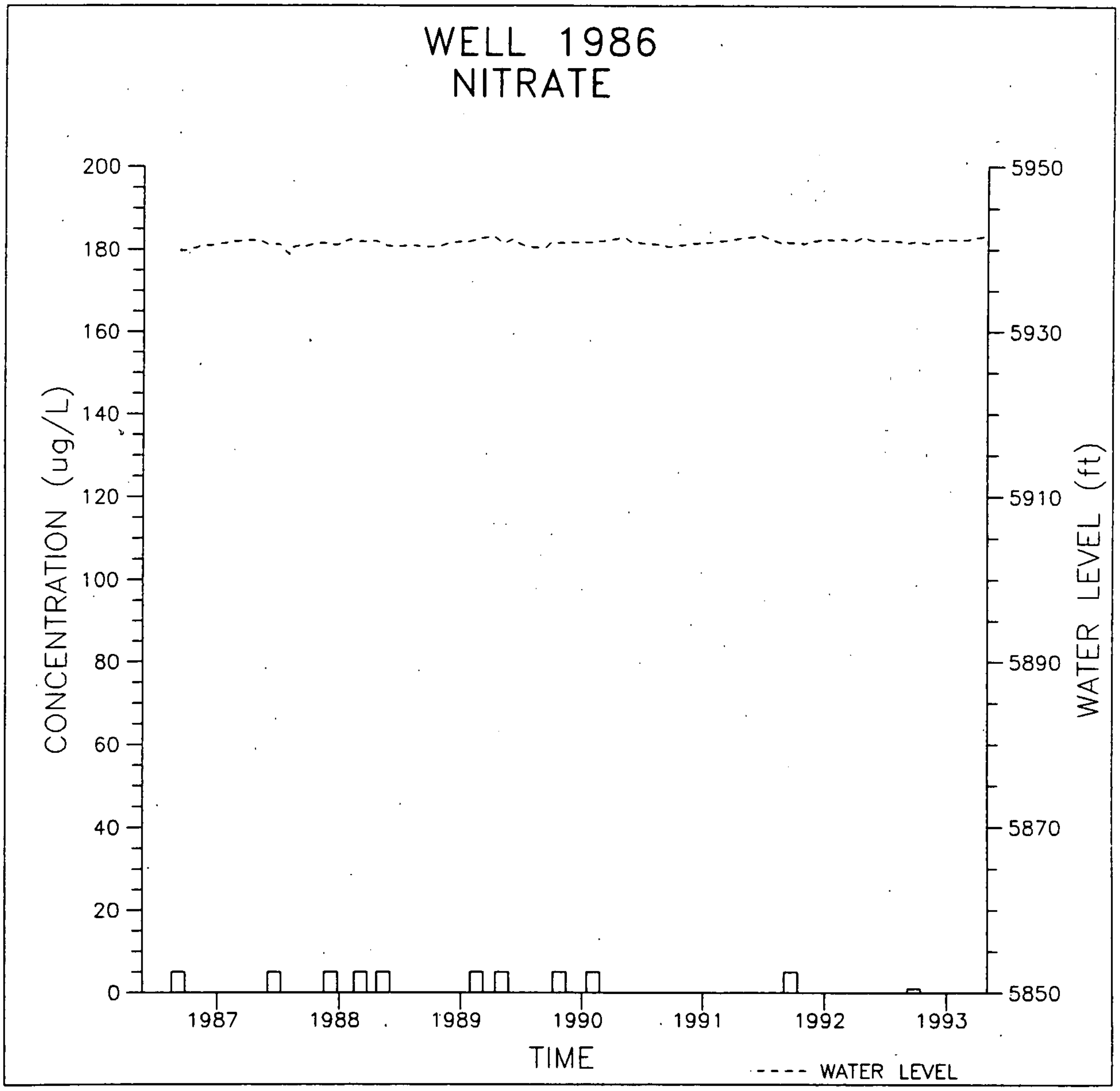
414

415



WELL P210189
TRITIUM
CONCENTRATION (pCi/L)
WATER LEVEL (ft)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

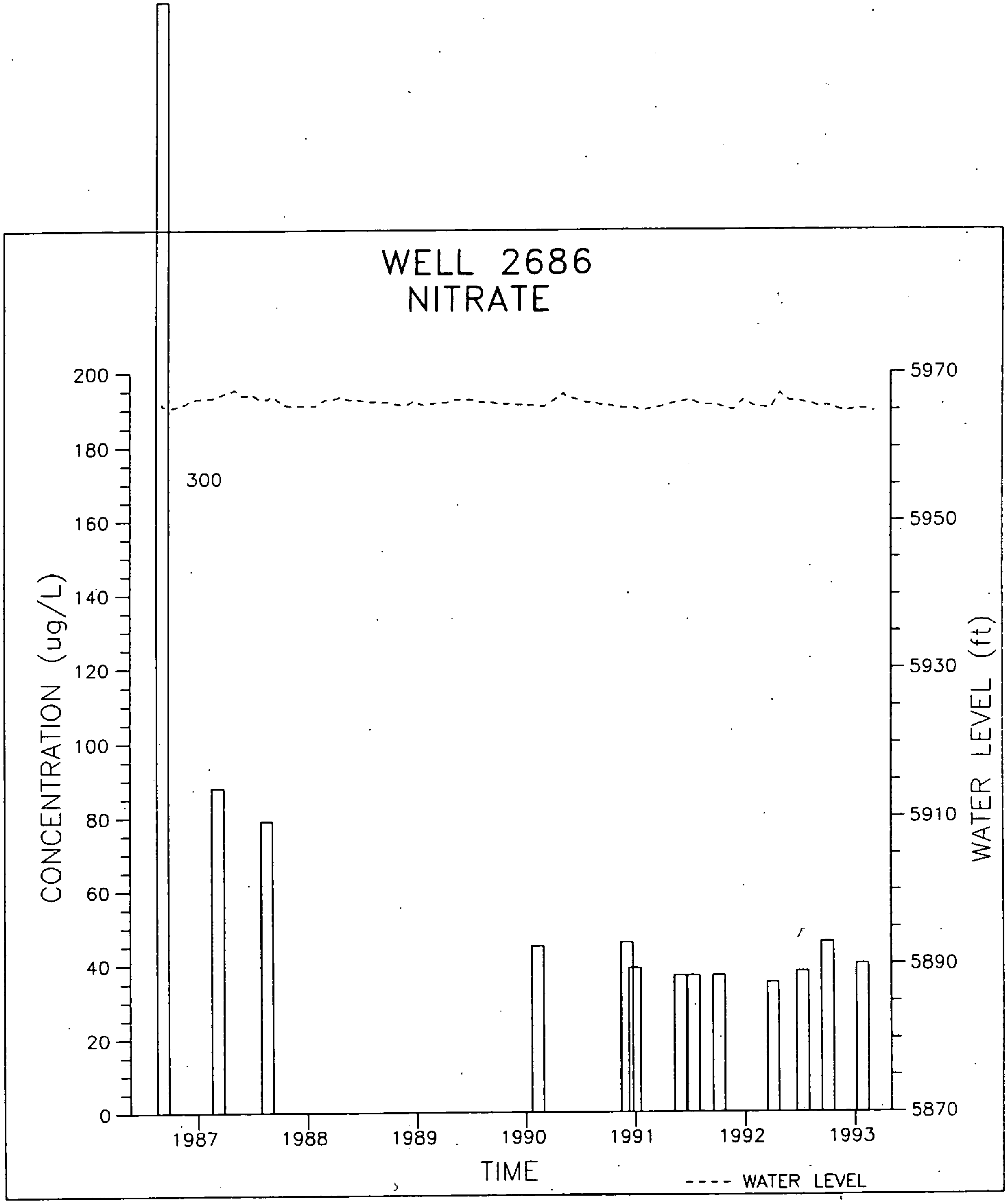
415



WELL 1986
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

416

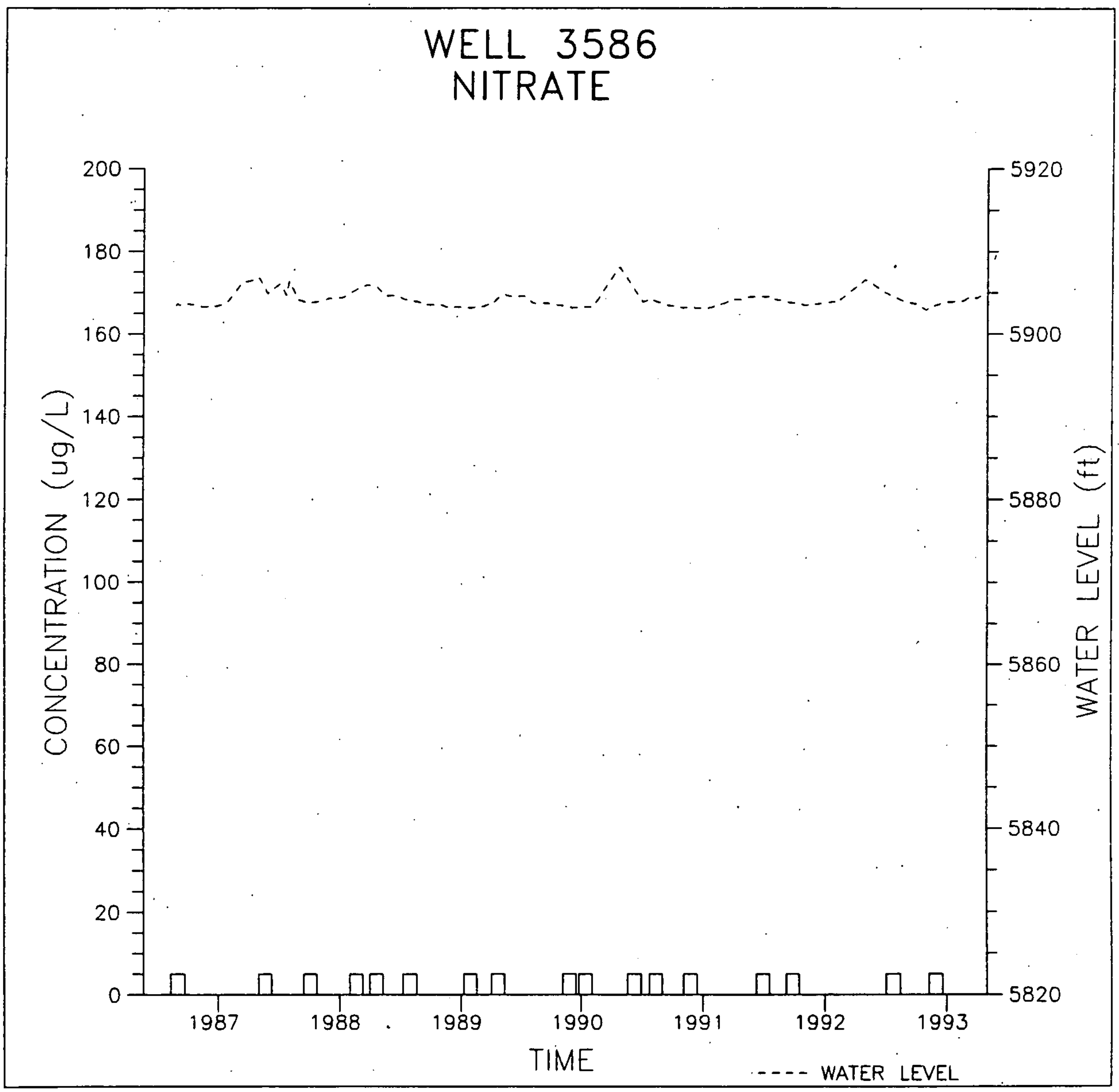
417



WELL 2686
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
300
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

417

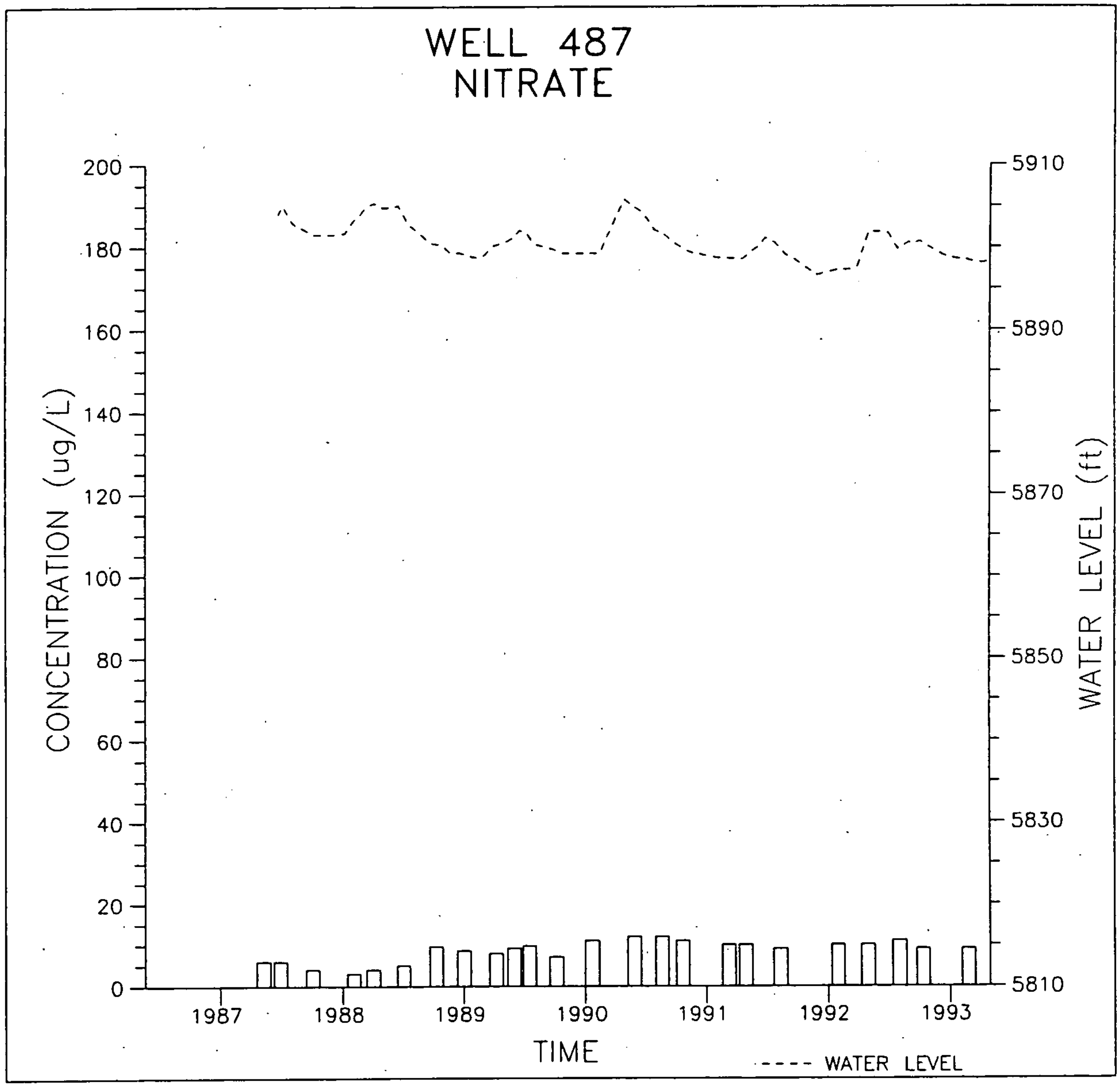
418



WELL 3586
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

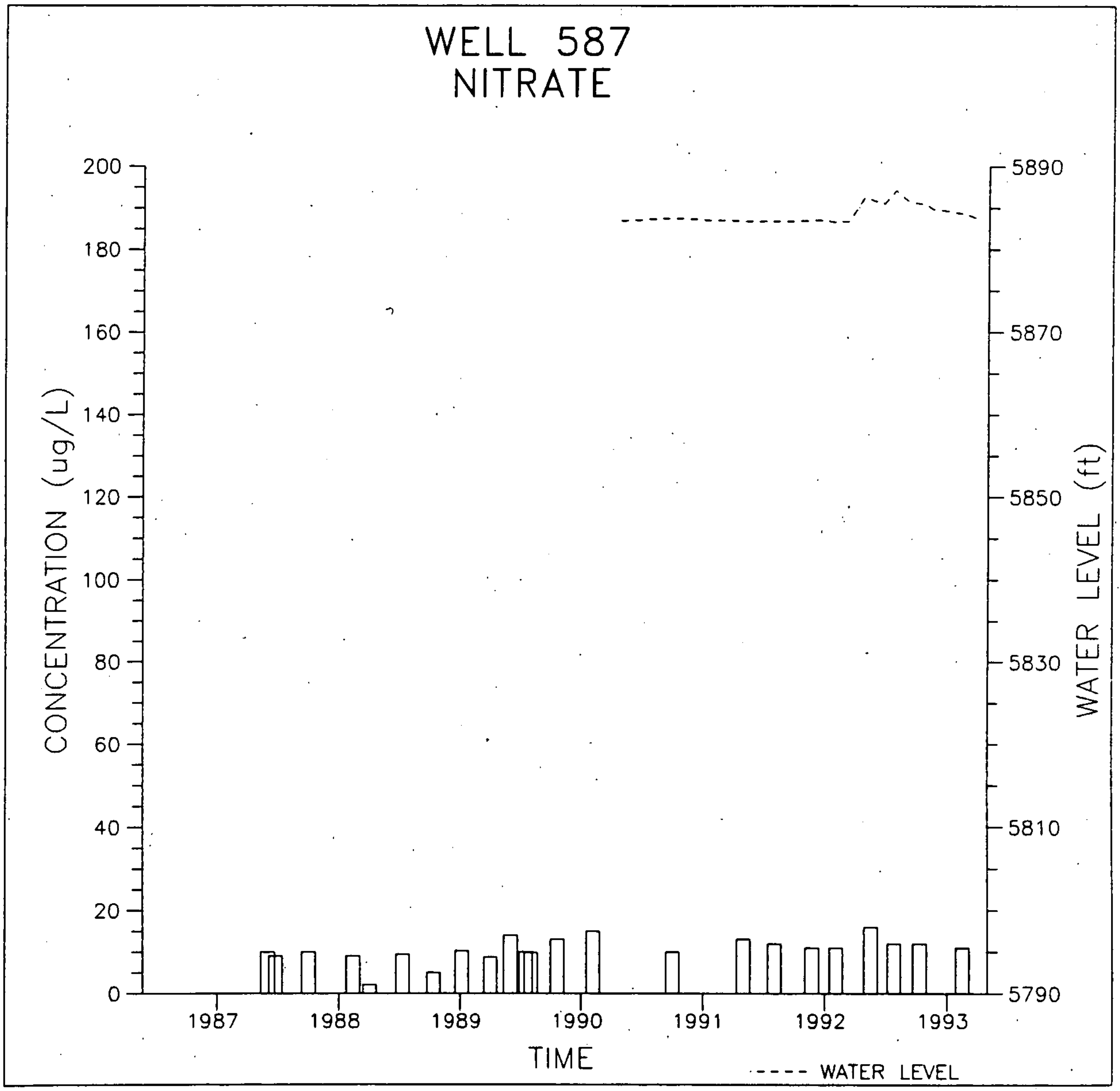
418

419


WELL 487
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

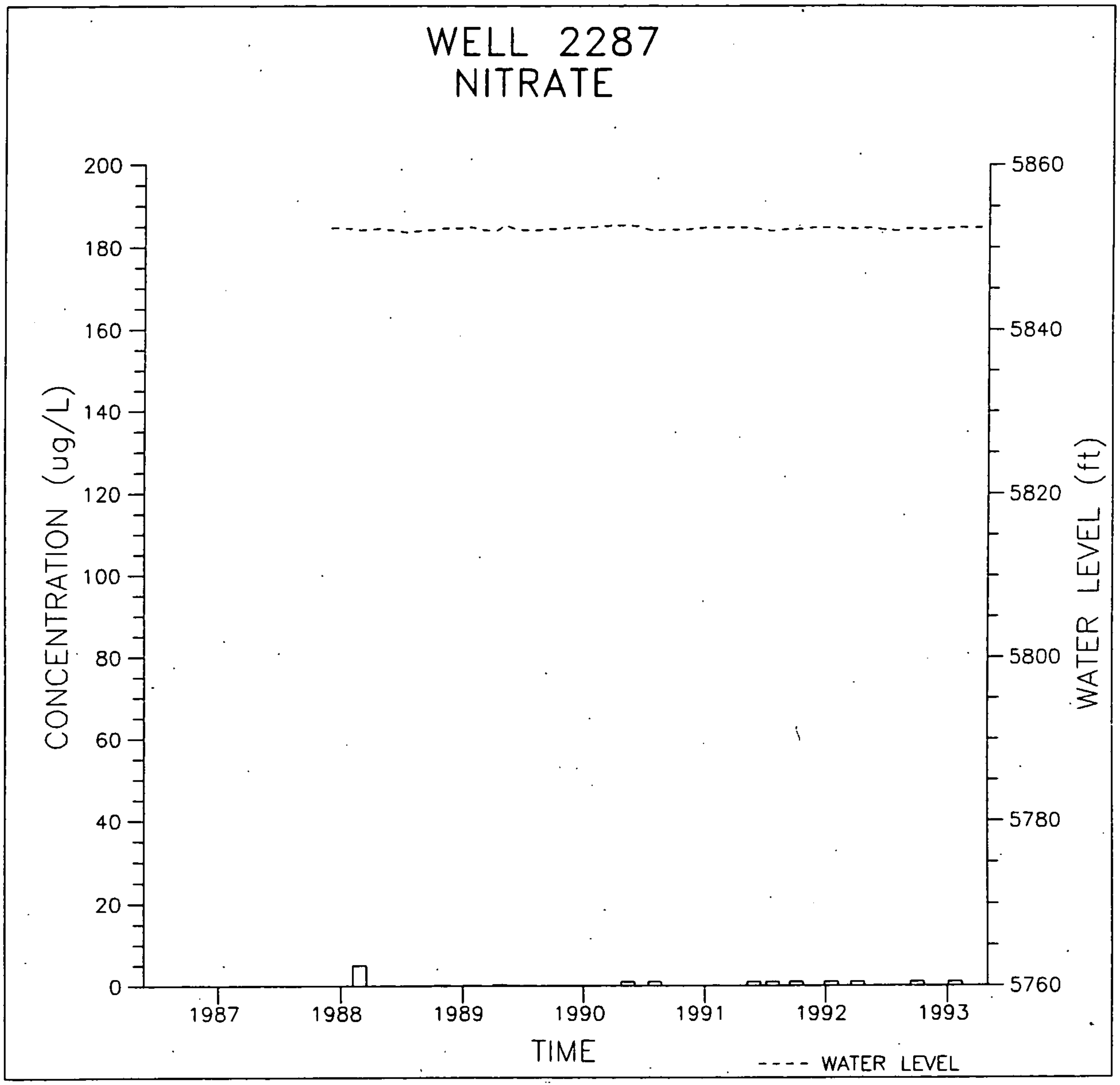
419

420



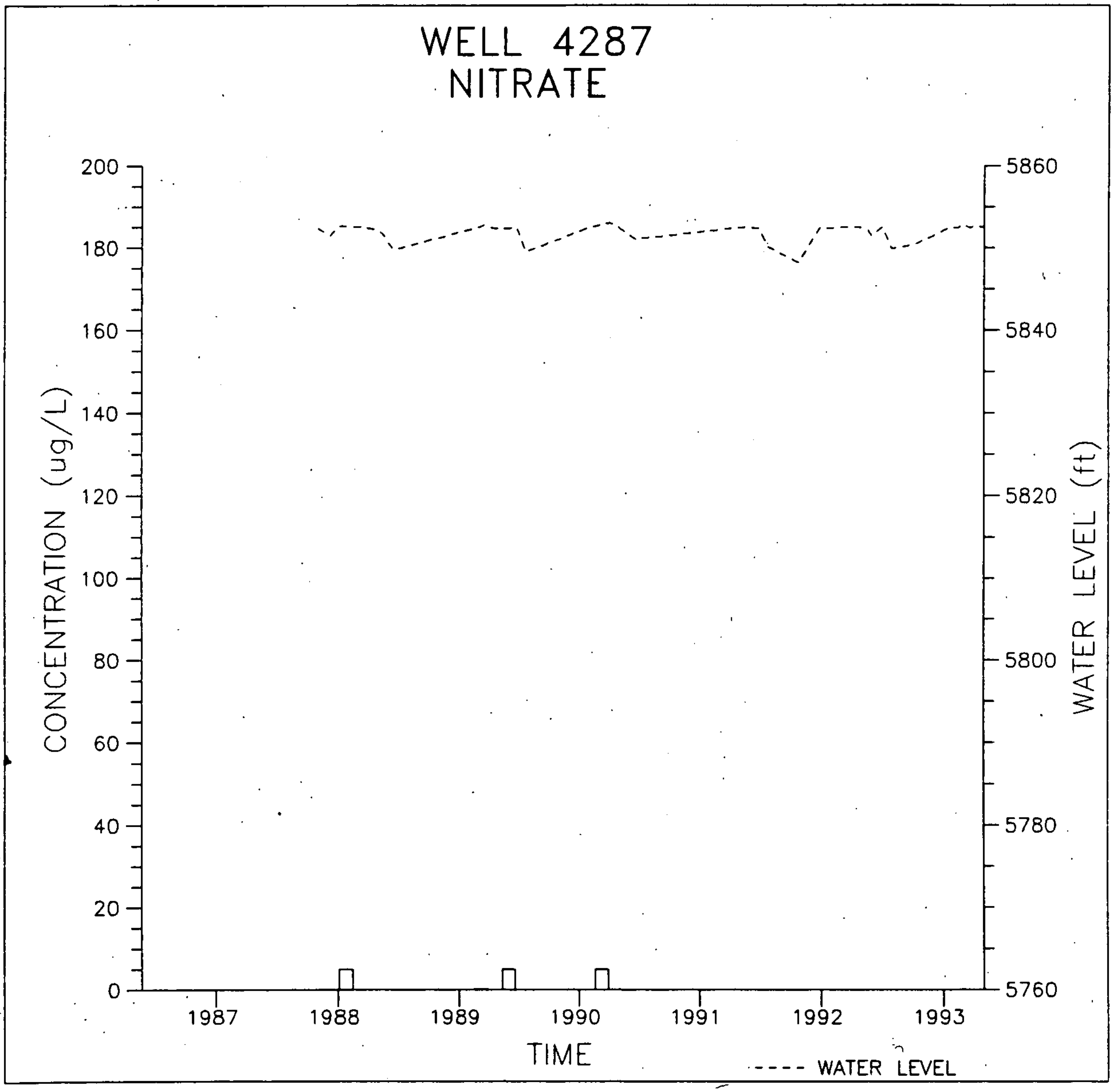
WELL 587
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

420


WELL 2287
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

421

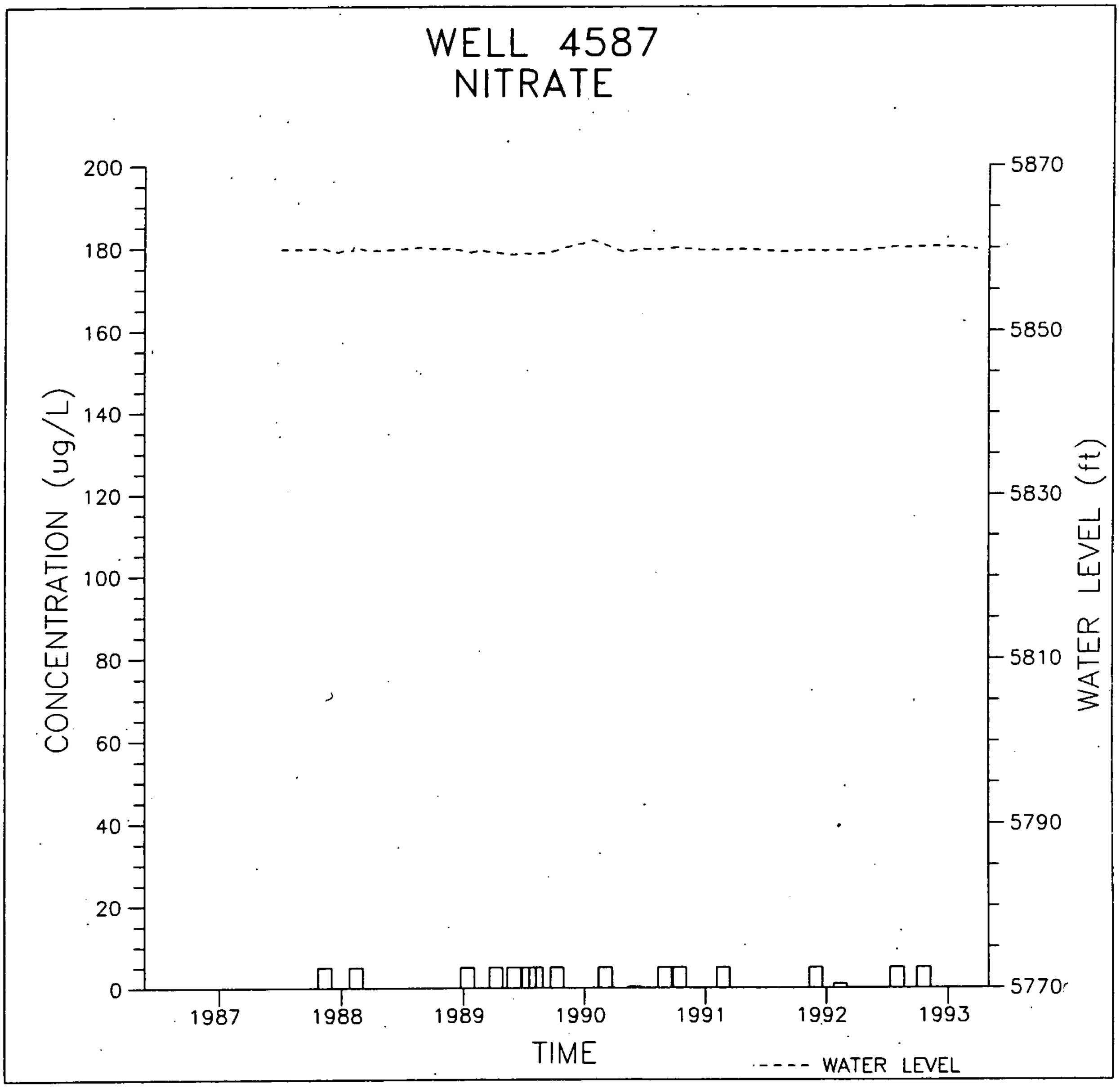
422



WELL 4287
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

422

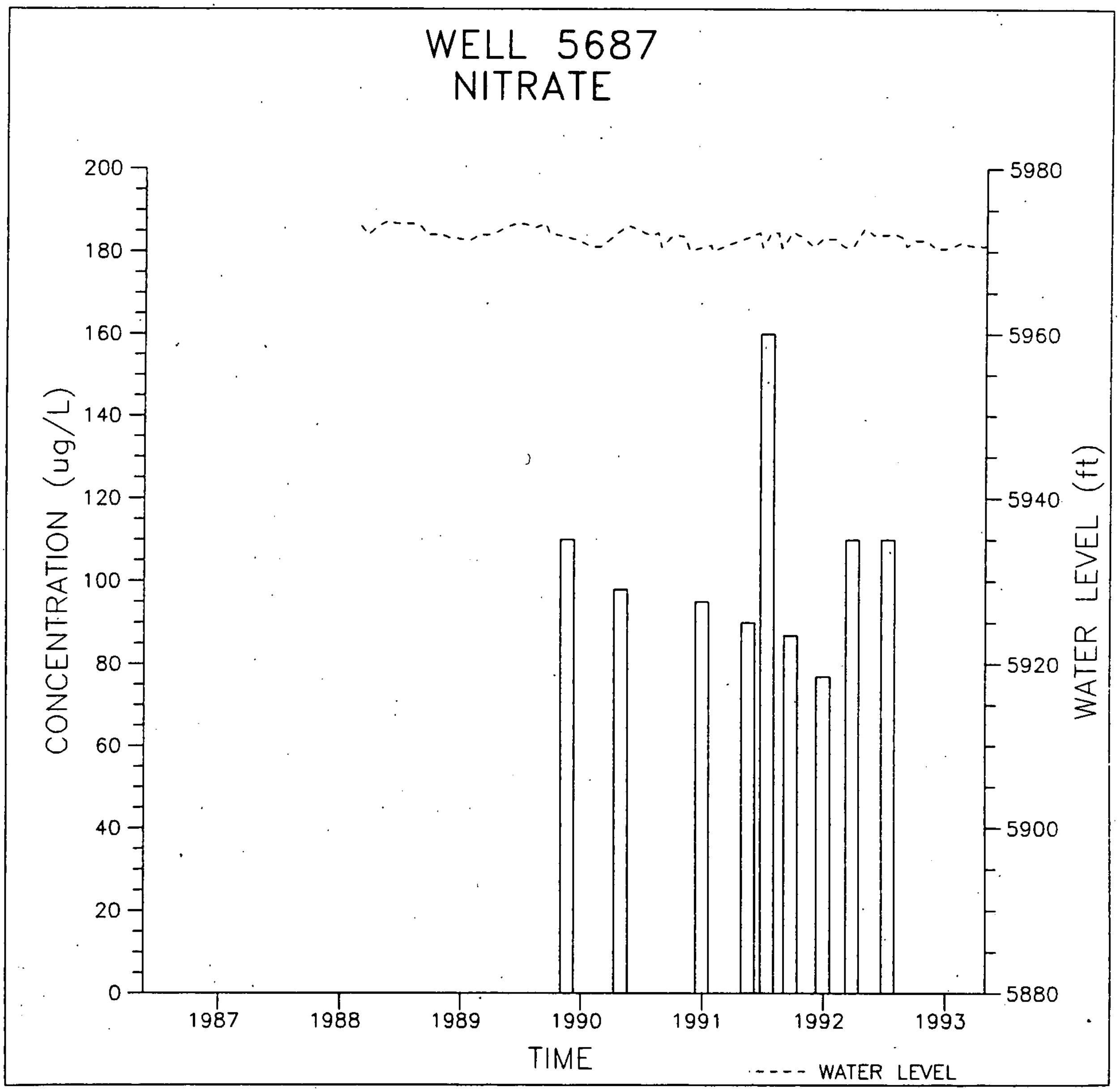
422



WELL 4587
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993

423

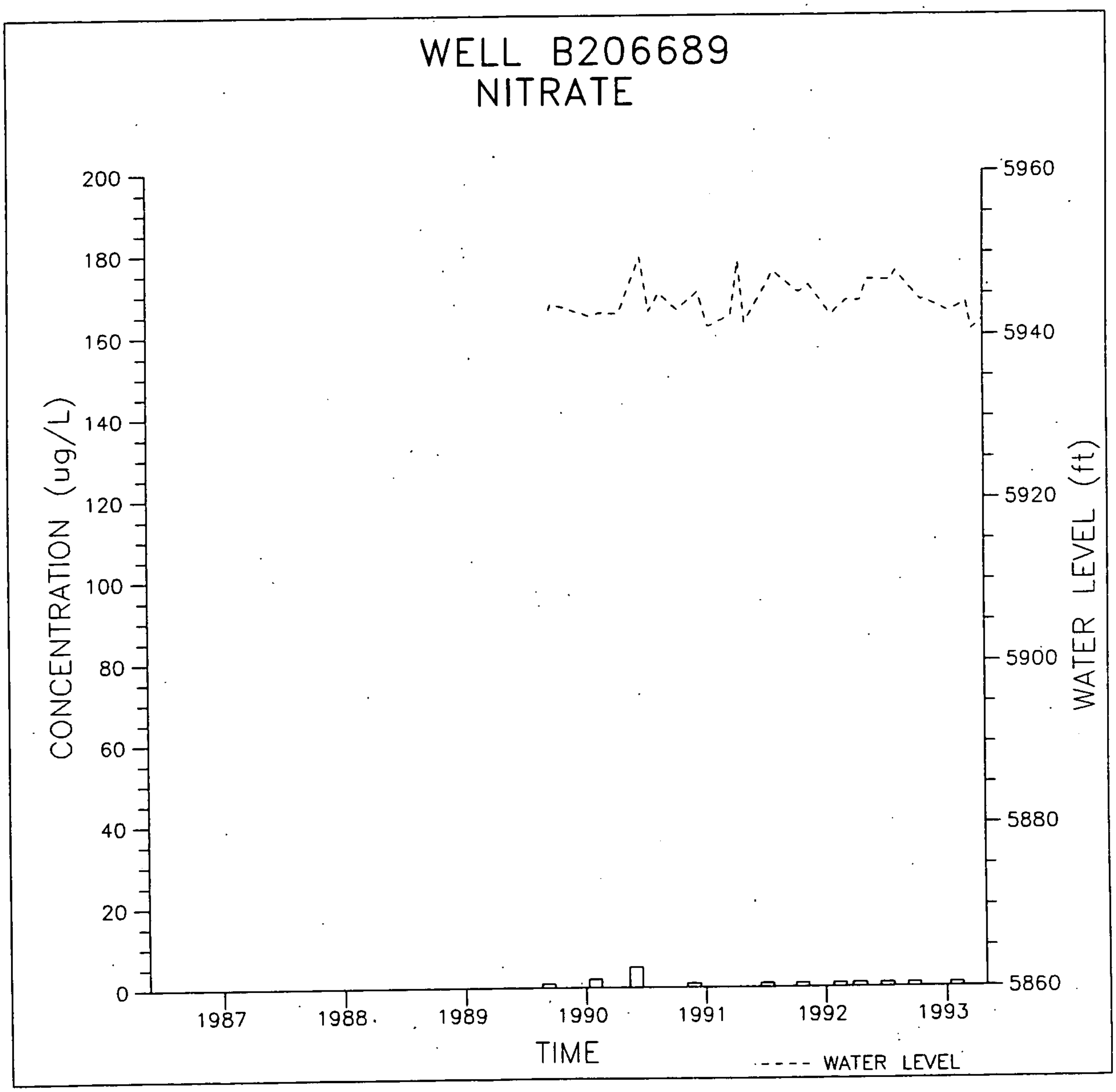
424



WELL 5687
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

424

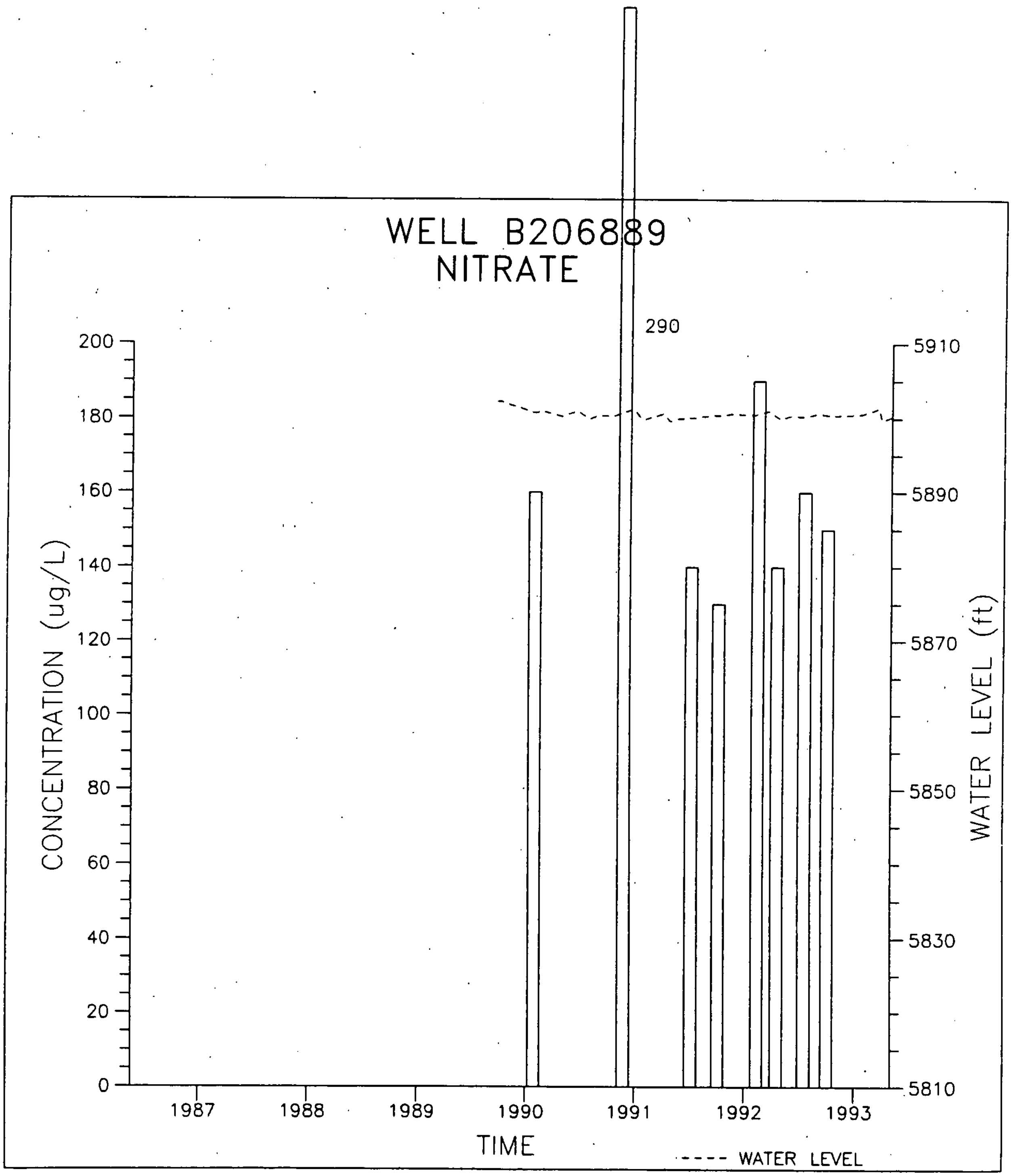
425



WELL B206689
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

425

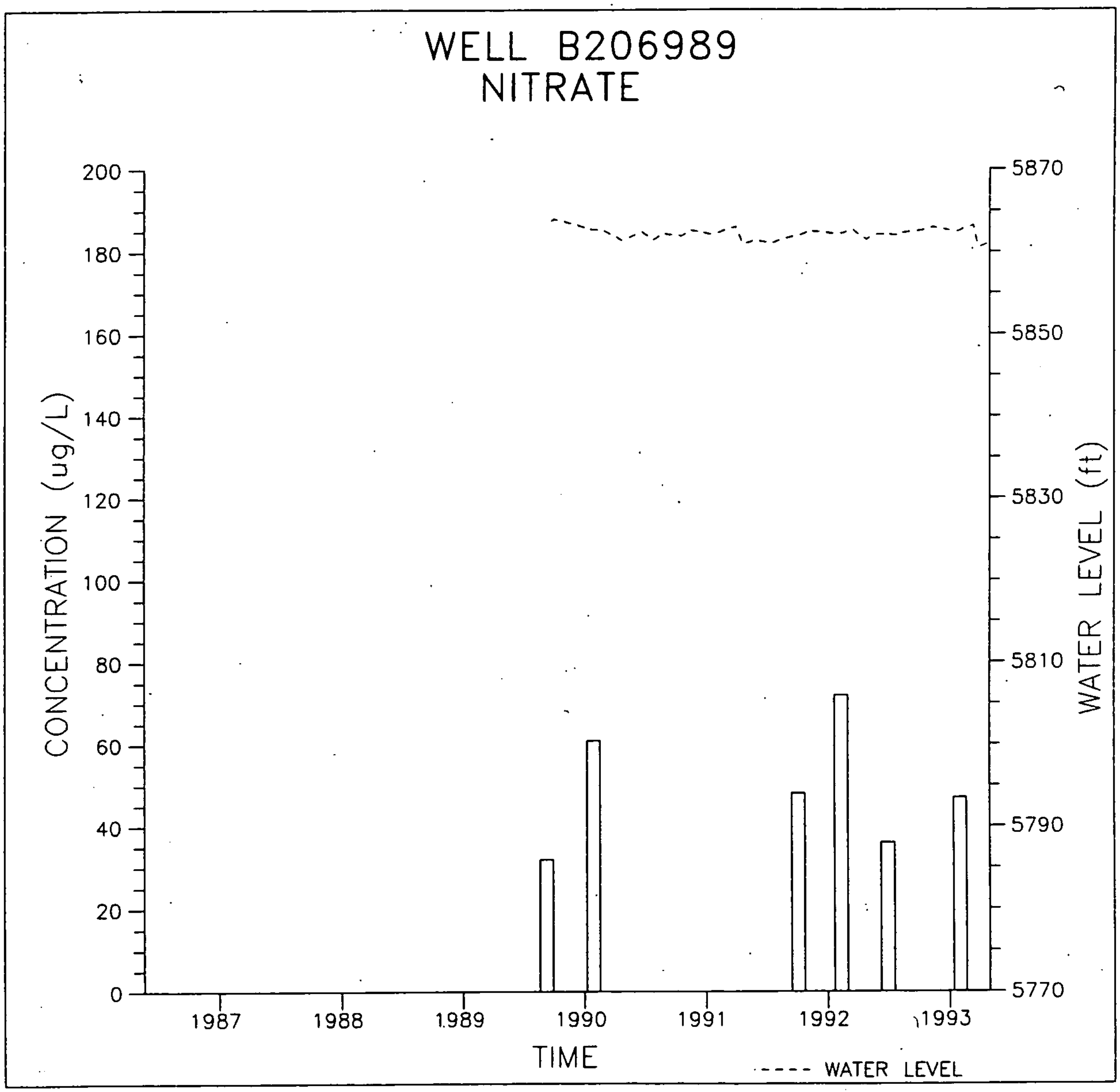
426



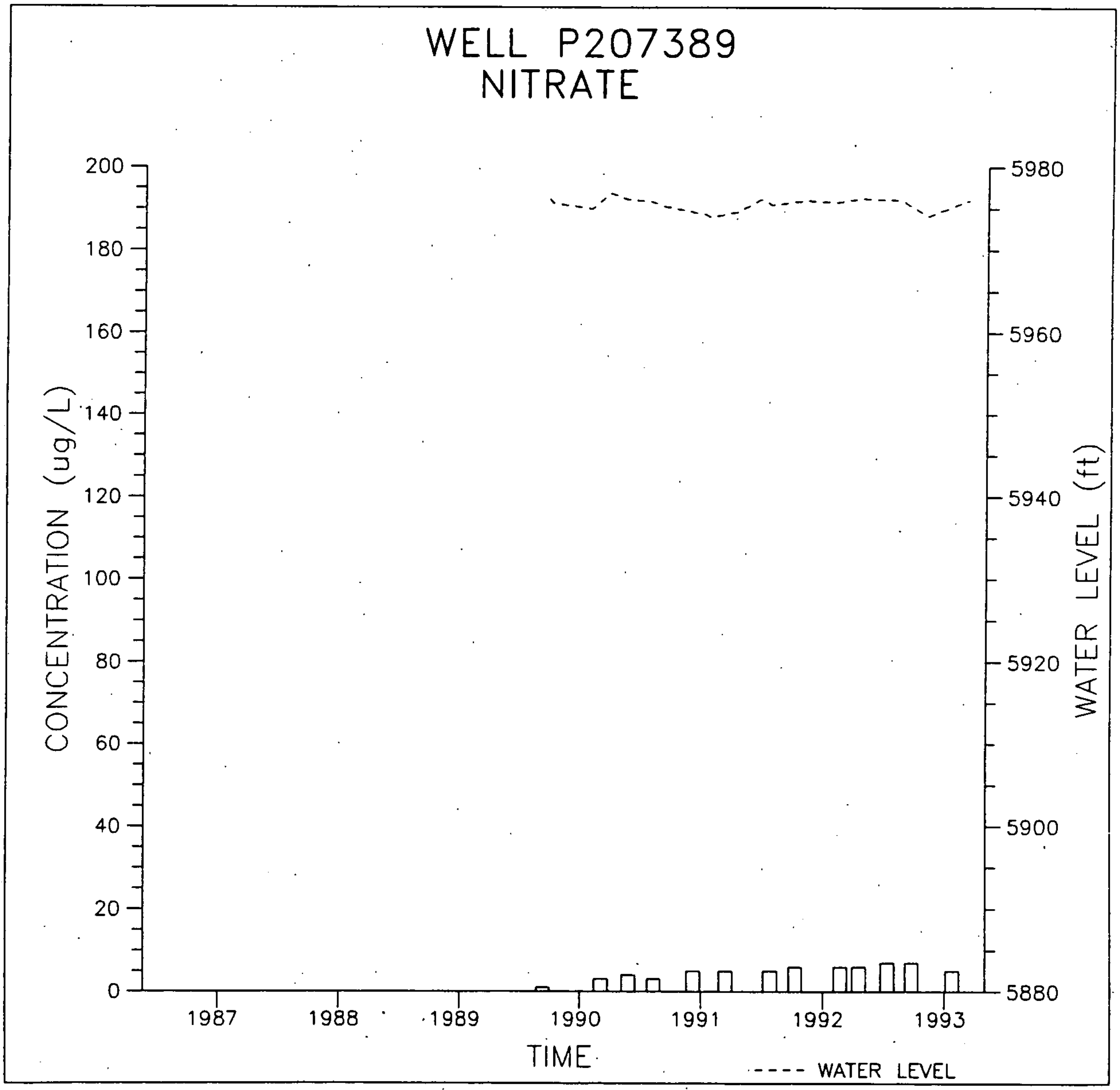
WELL B206889
NITRATE
290
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

426

427

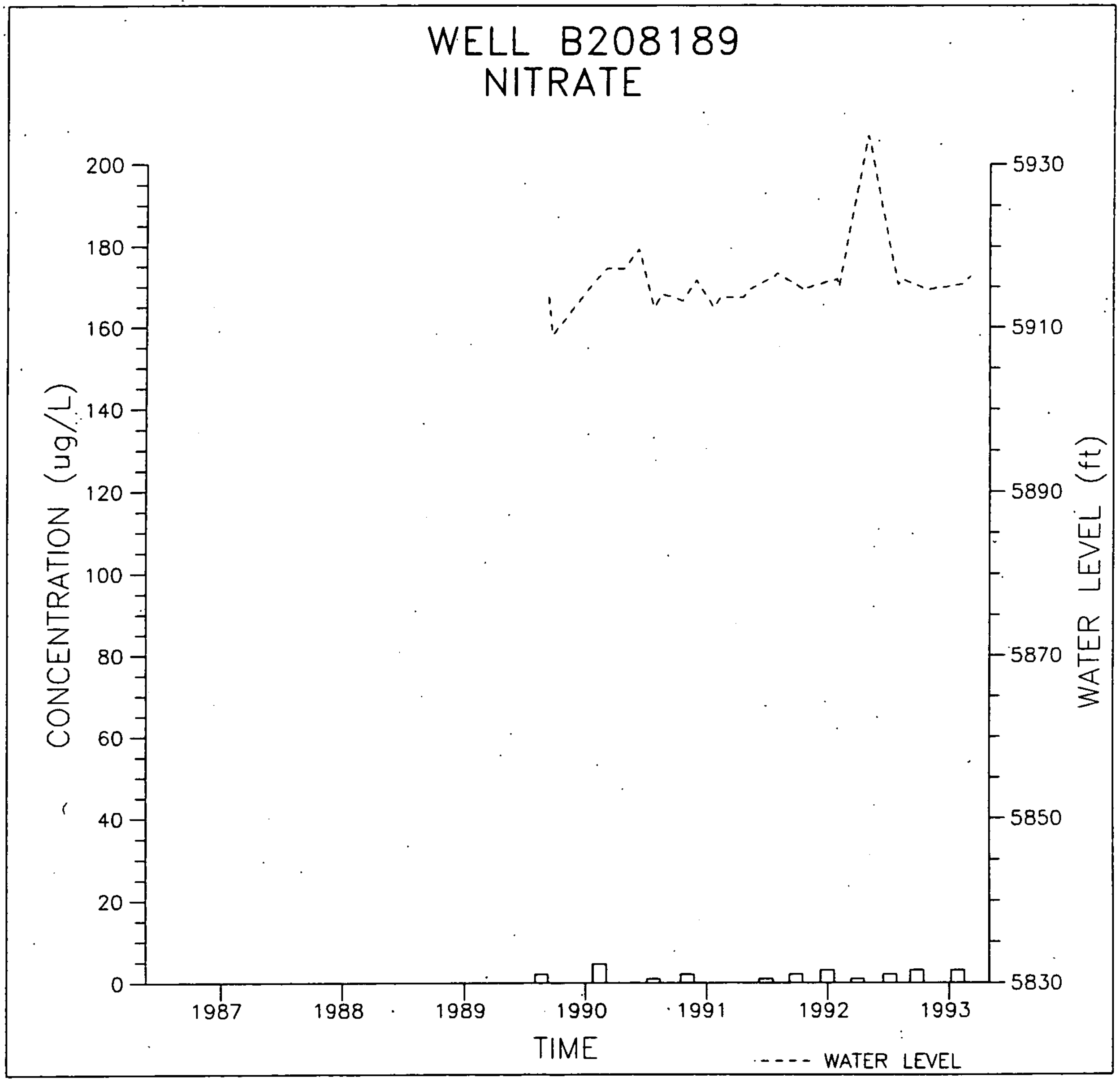

WELL B206989
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

427


WELL P207389
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

428

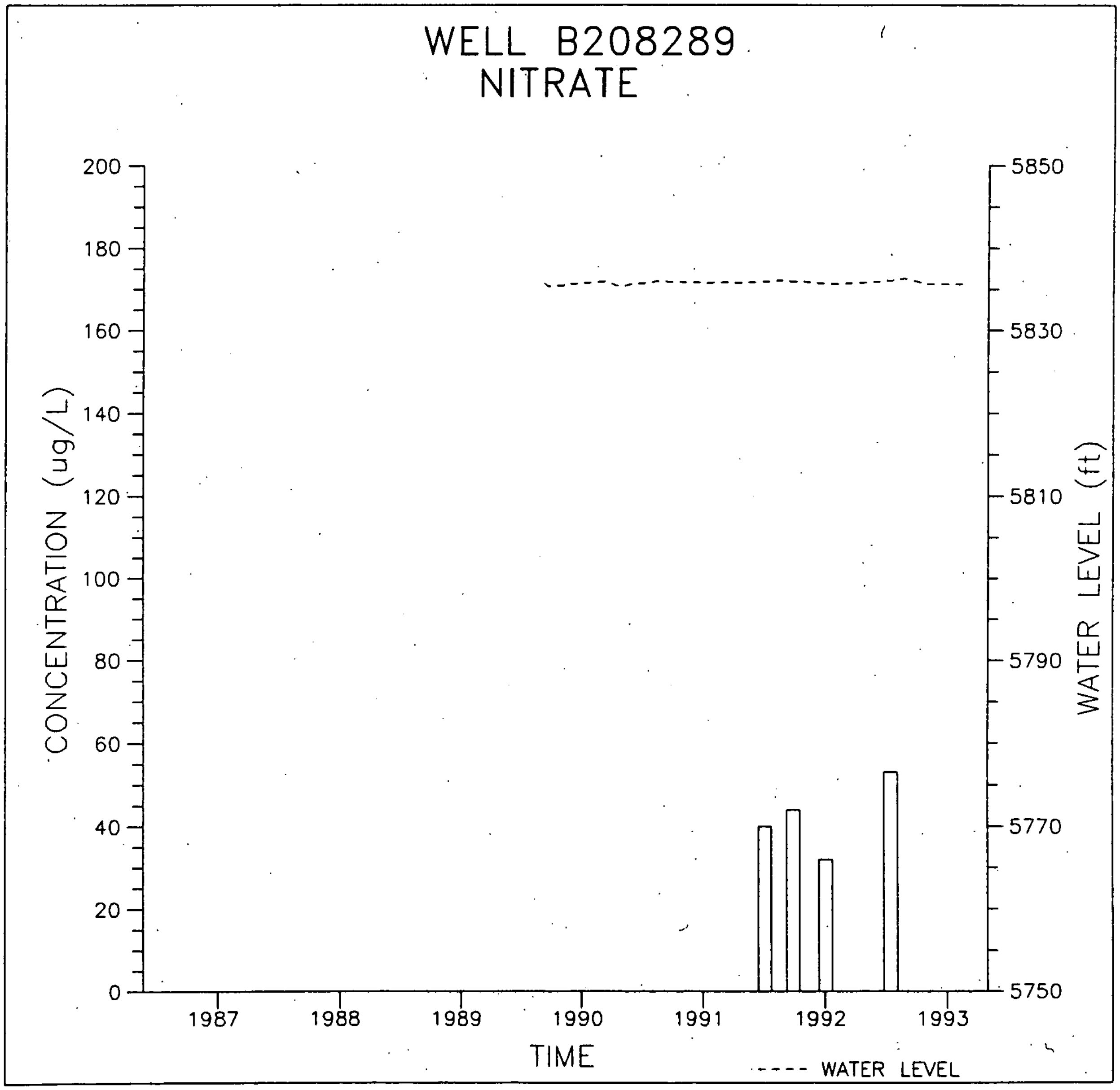
#29



WELL B208189
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

429

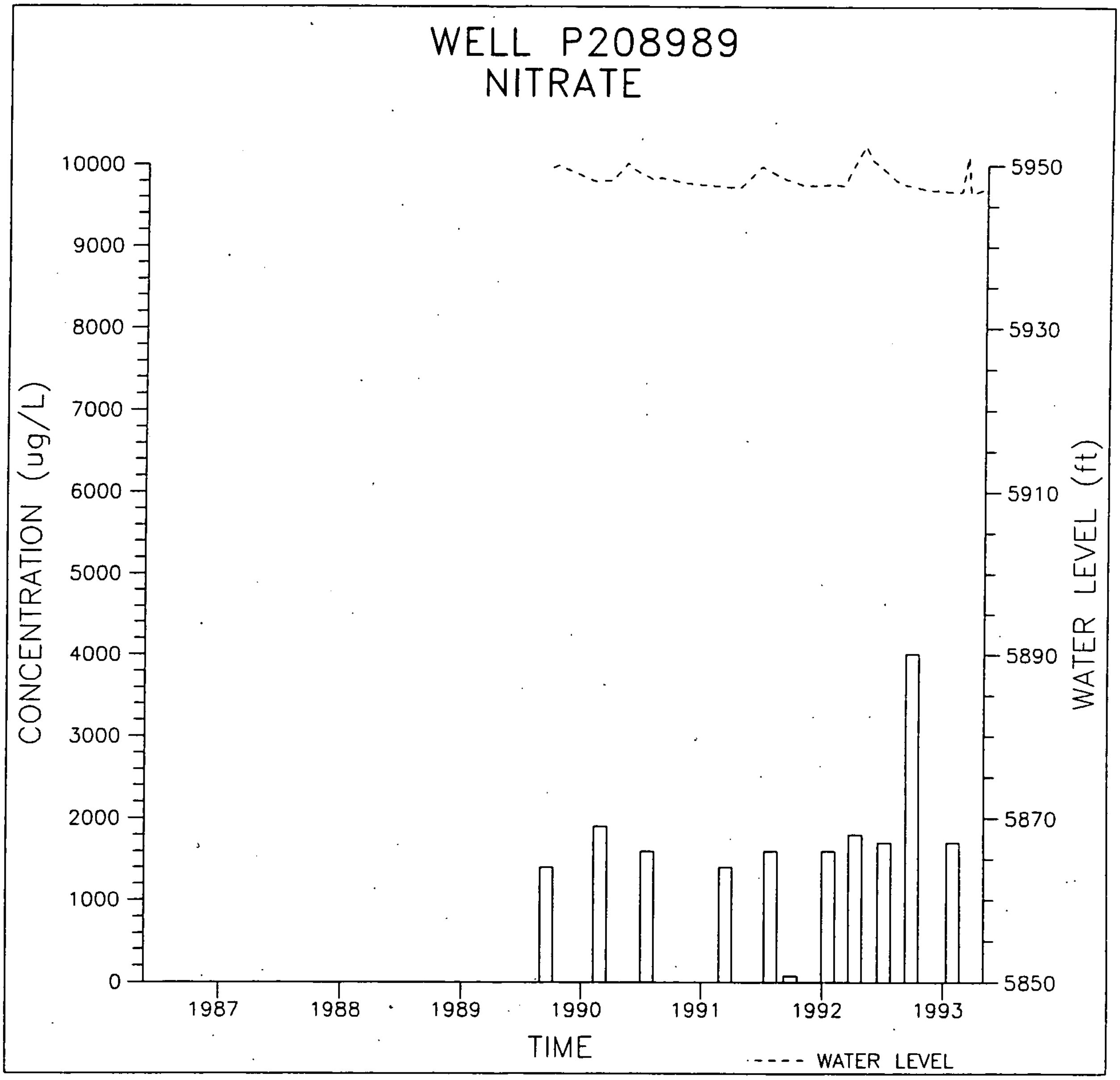
430



WELL B208289
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

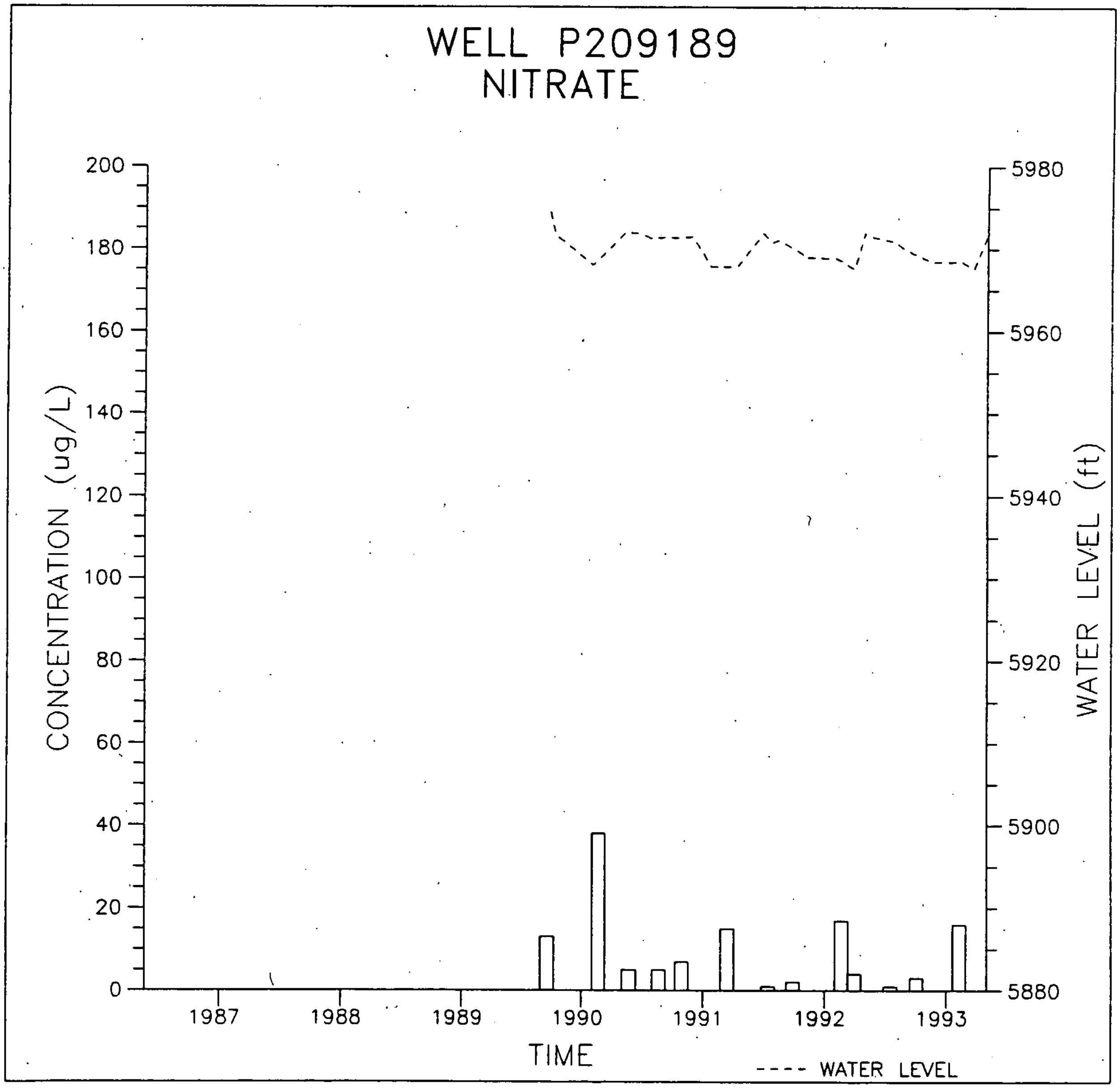
430

#31


WELL P208989
NITRATE
CONCENTRATION (ug/L)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

431

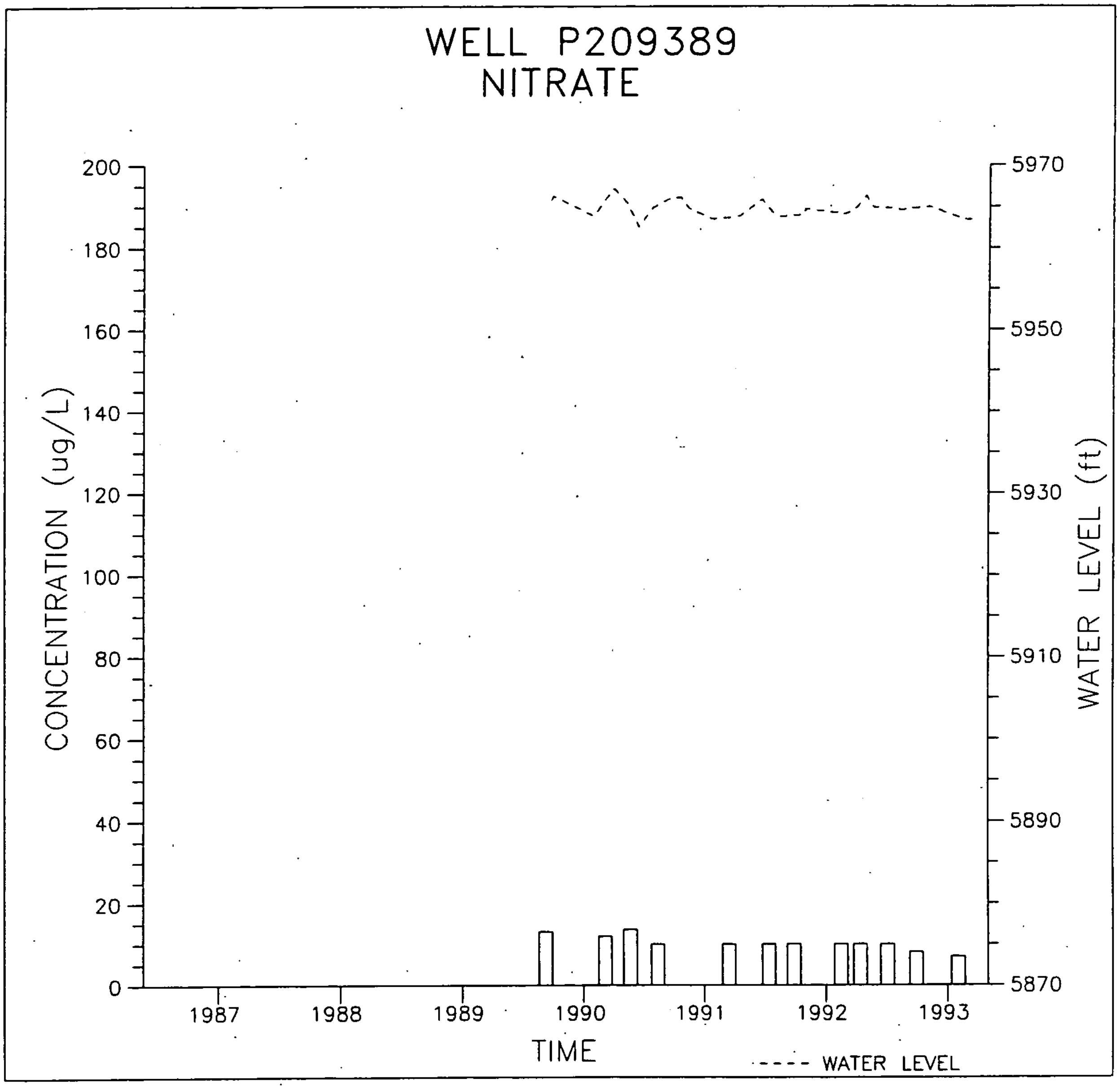
#32



WELL P209189
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

432

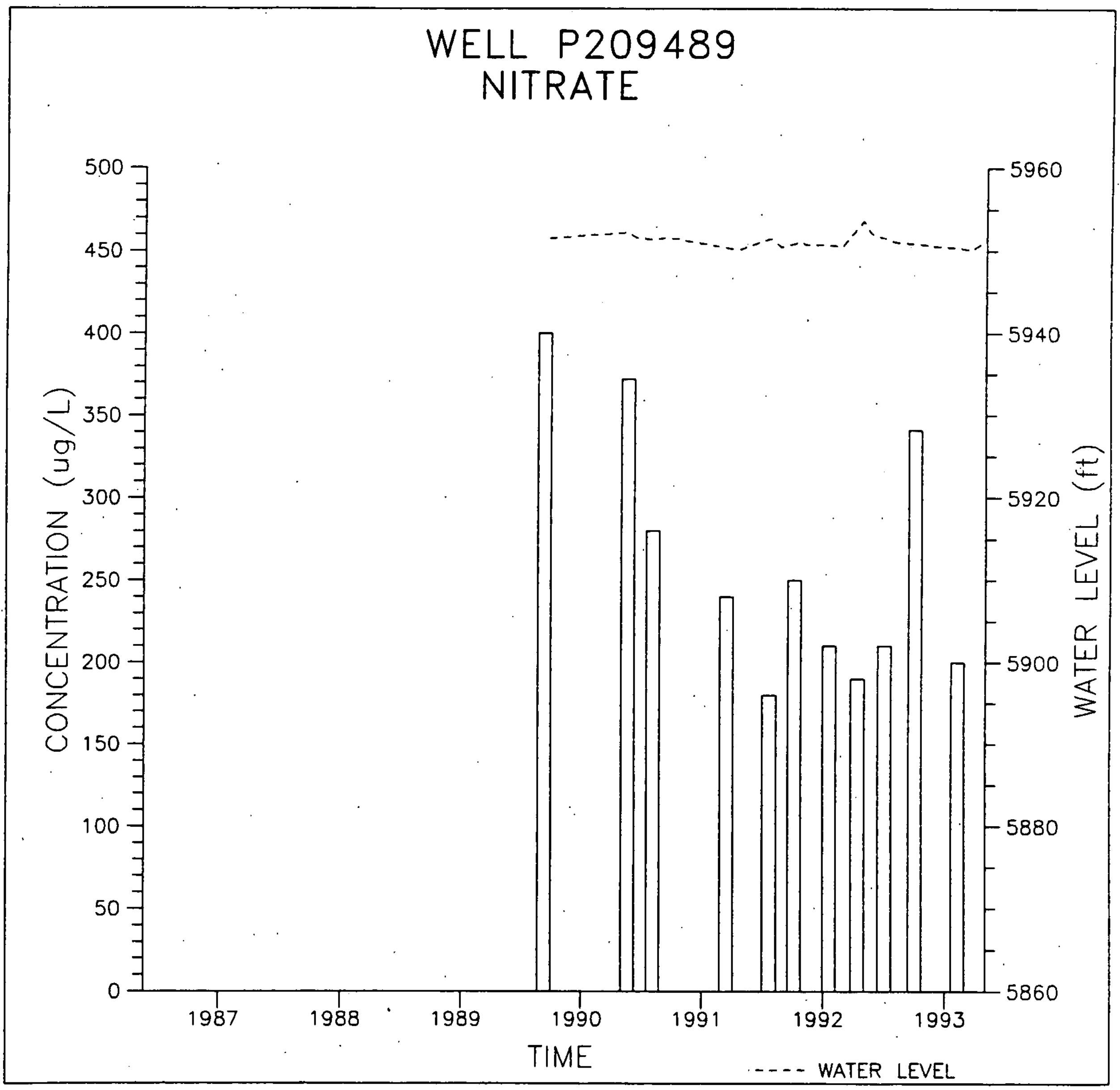
433



WELL P209389
NITRATE
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

433

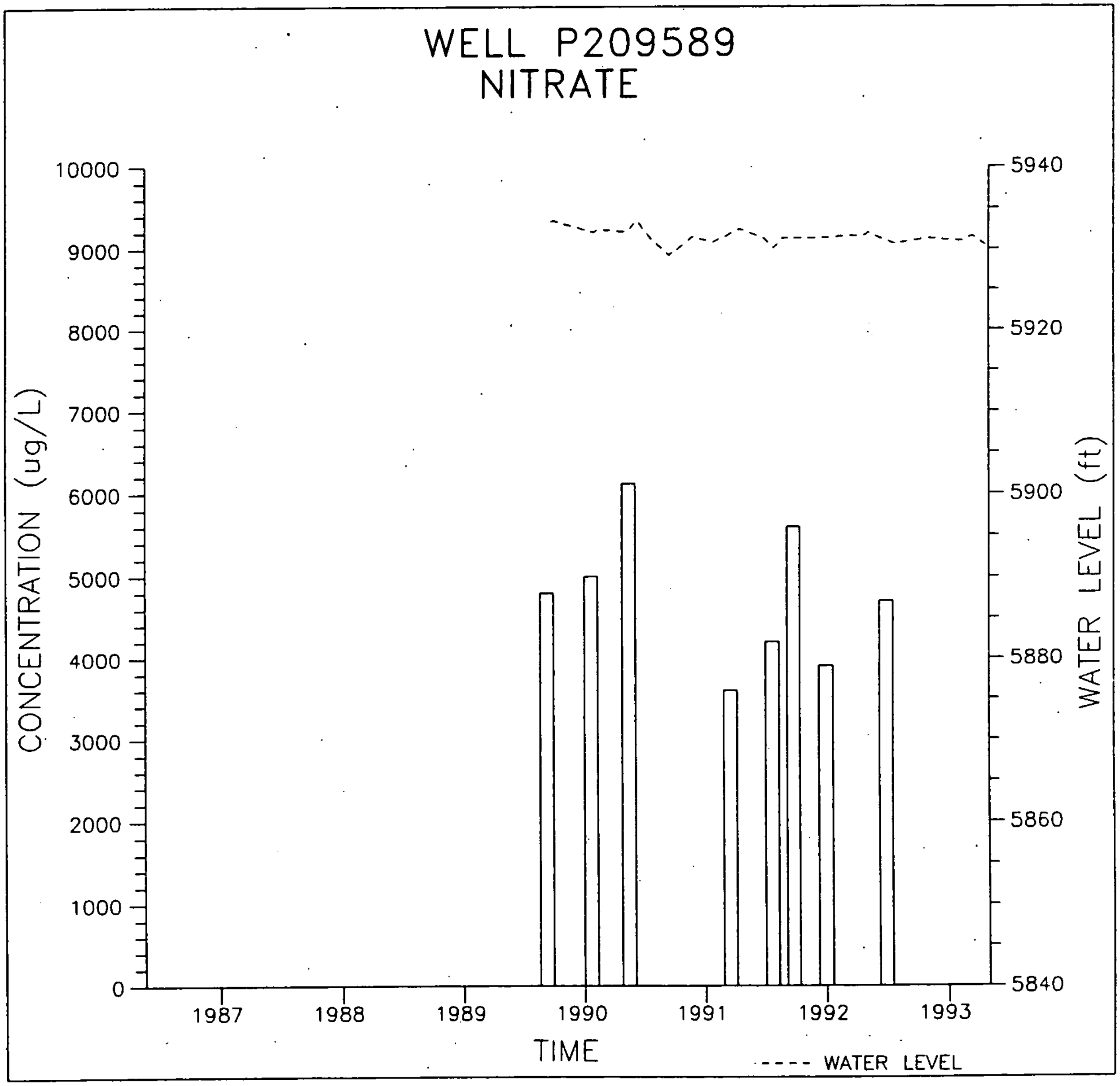
434



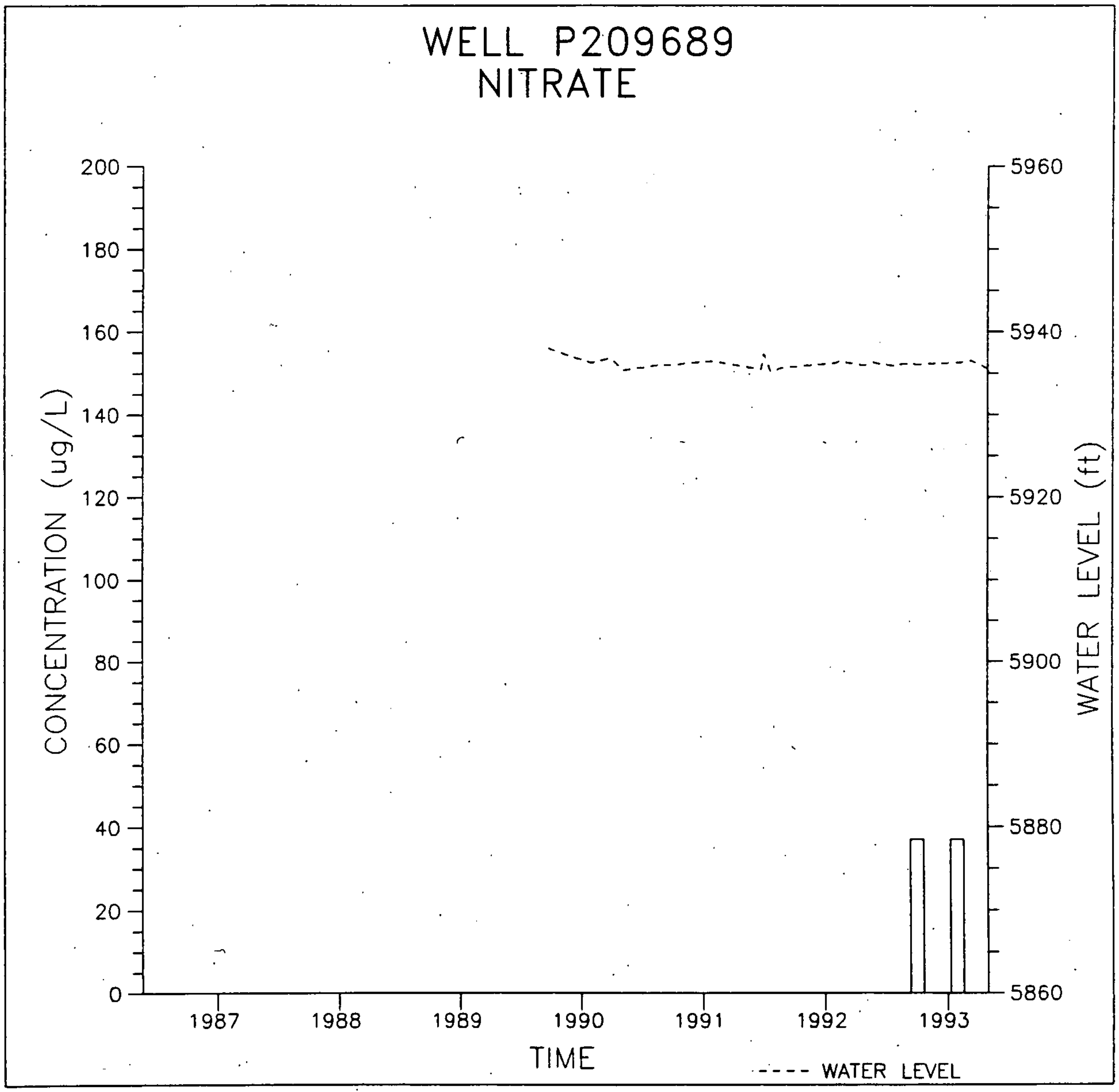
WELL P209489
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
WATER LEVEL
0
50
100
150
200
250
300
350
400
450
500
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993

434

~~435~~

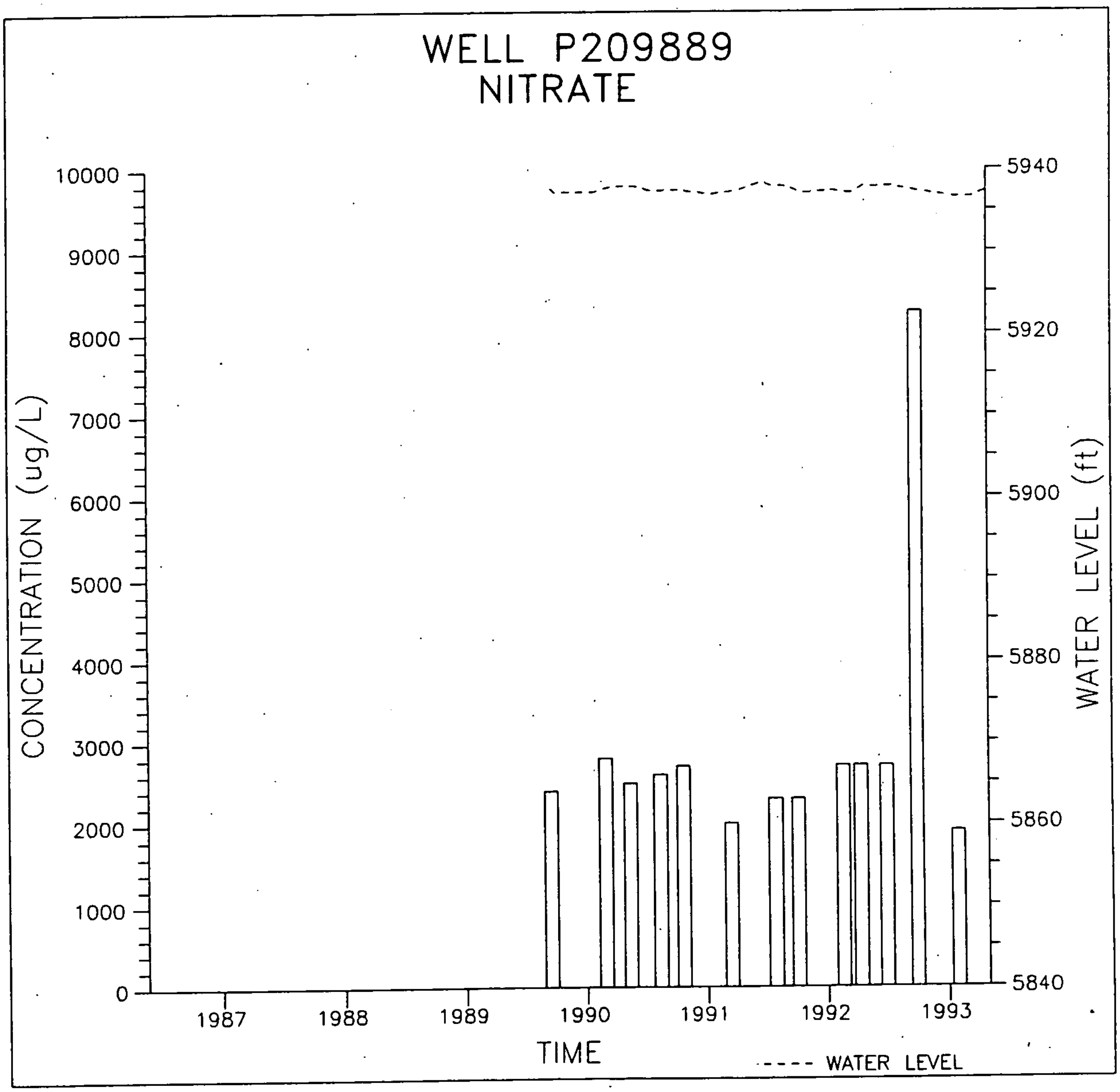


WELL P209589
NITRATE
CONCENTRATION (ug/L)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

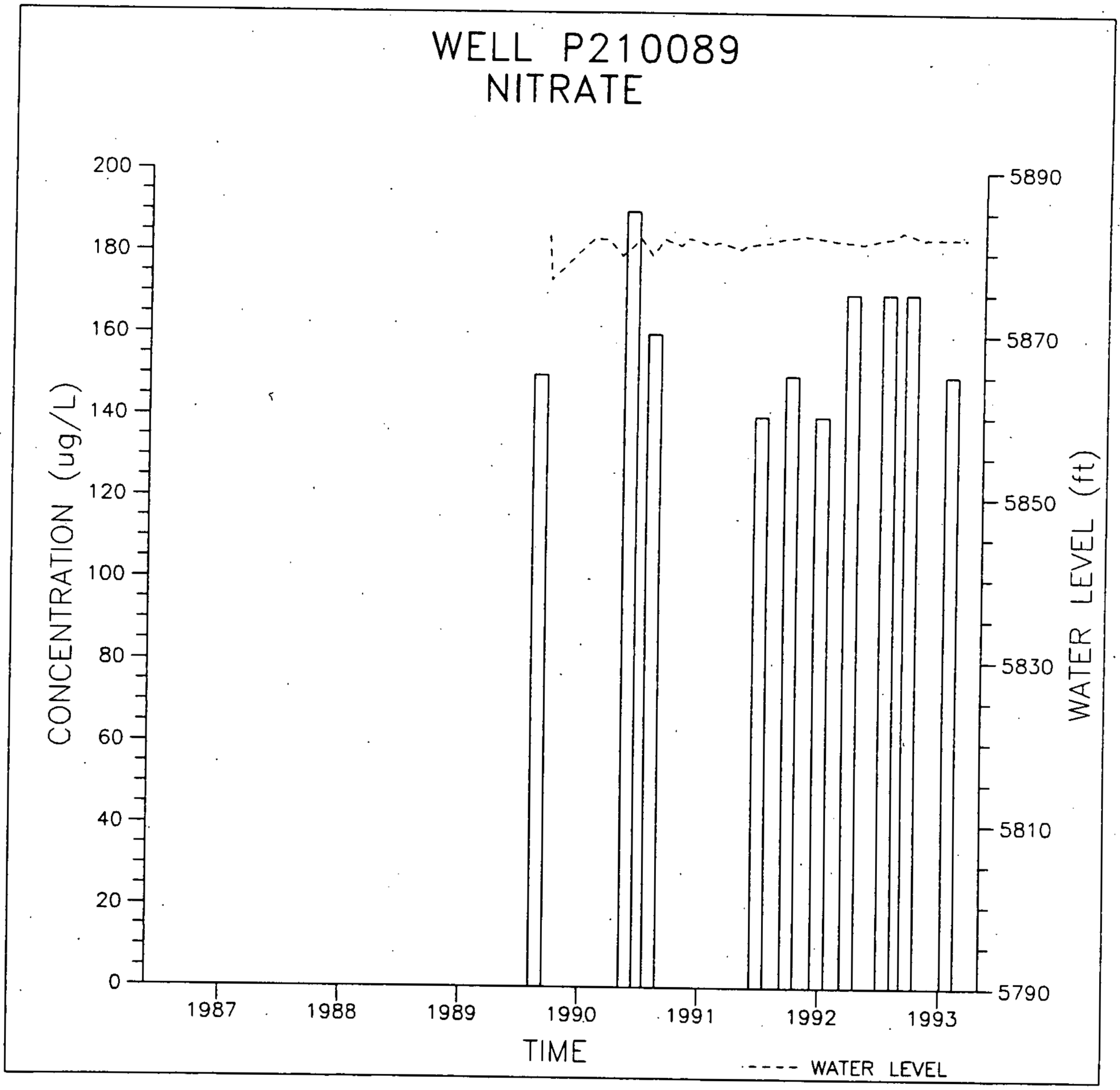

WELL P209689
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

437

436

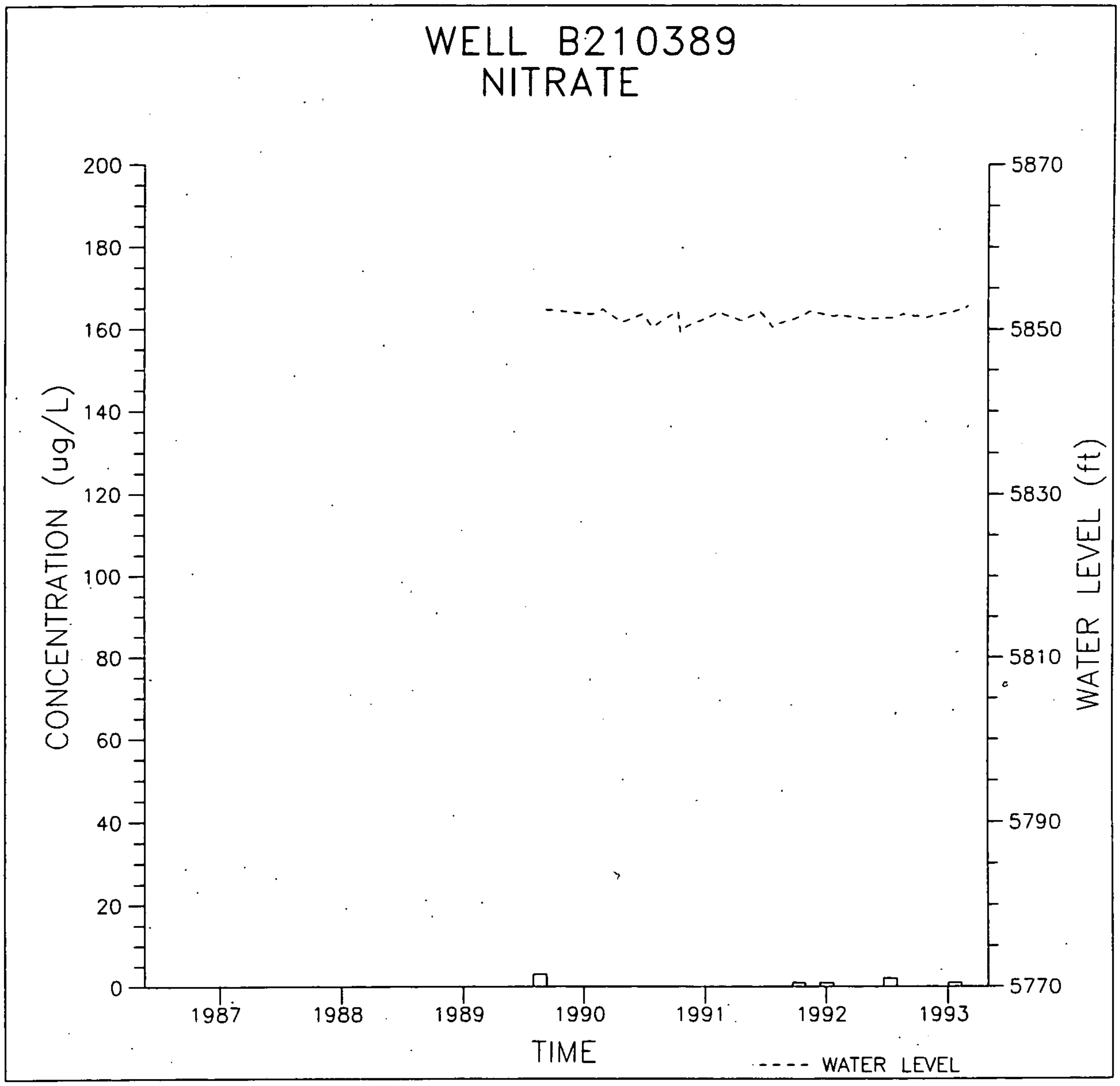


WELL P209889
NITRATE
CONCENTRATION (ug/L)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL


WELL P210089
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
5890
5870
5850
5830
5810
5790
WATER LEVEL (ft)
WATER LEVEL

438

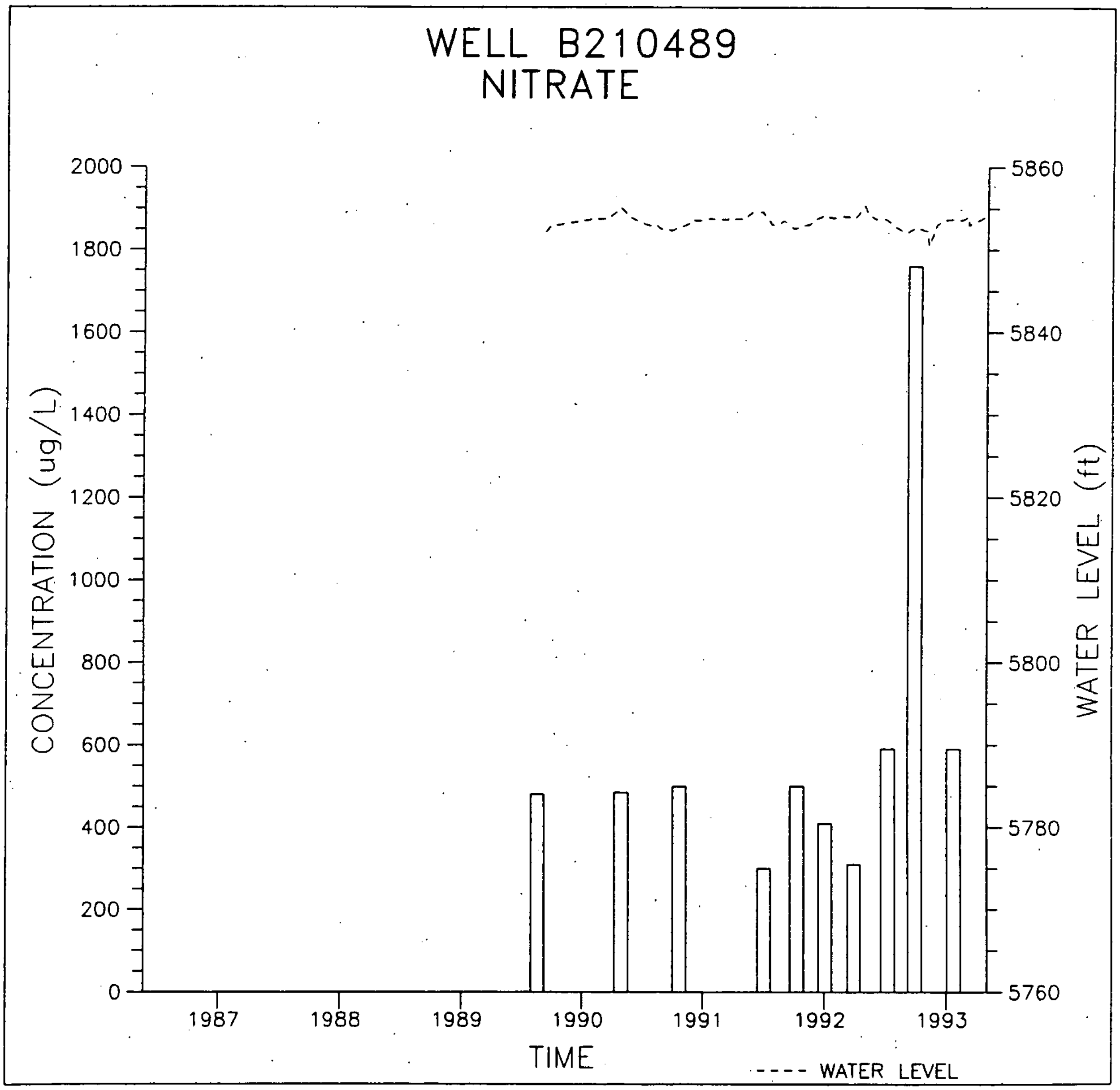
439



WELL B210389
NITRATE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

439

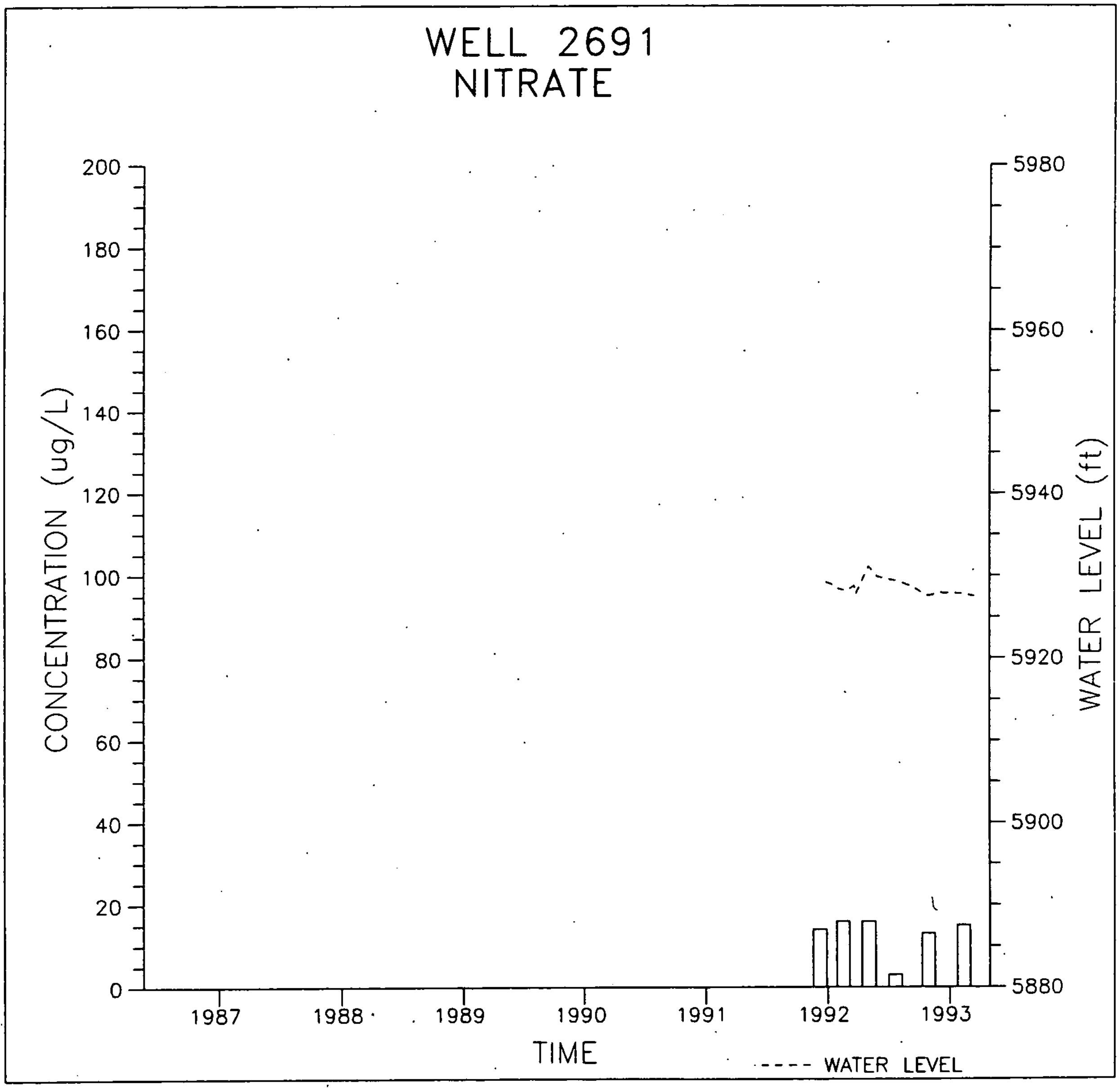
#440



WELL B210489
NITRATE
CONCENTRATION (ug/L)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

440

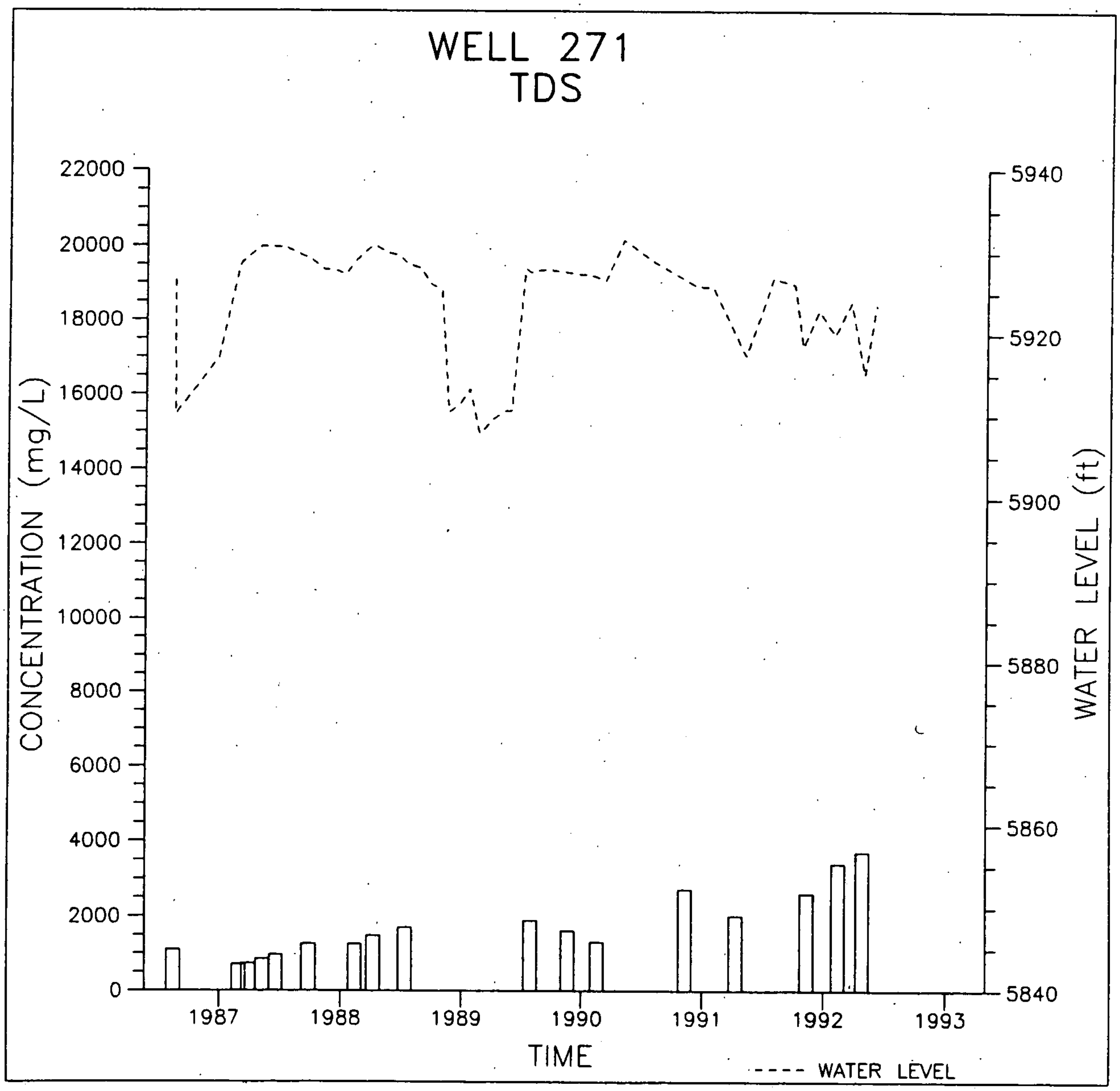
441



WELL 2691
NITRATE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

441

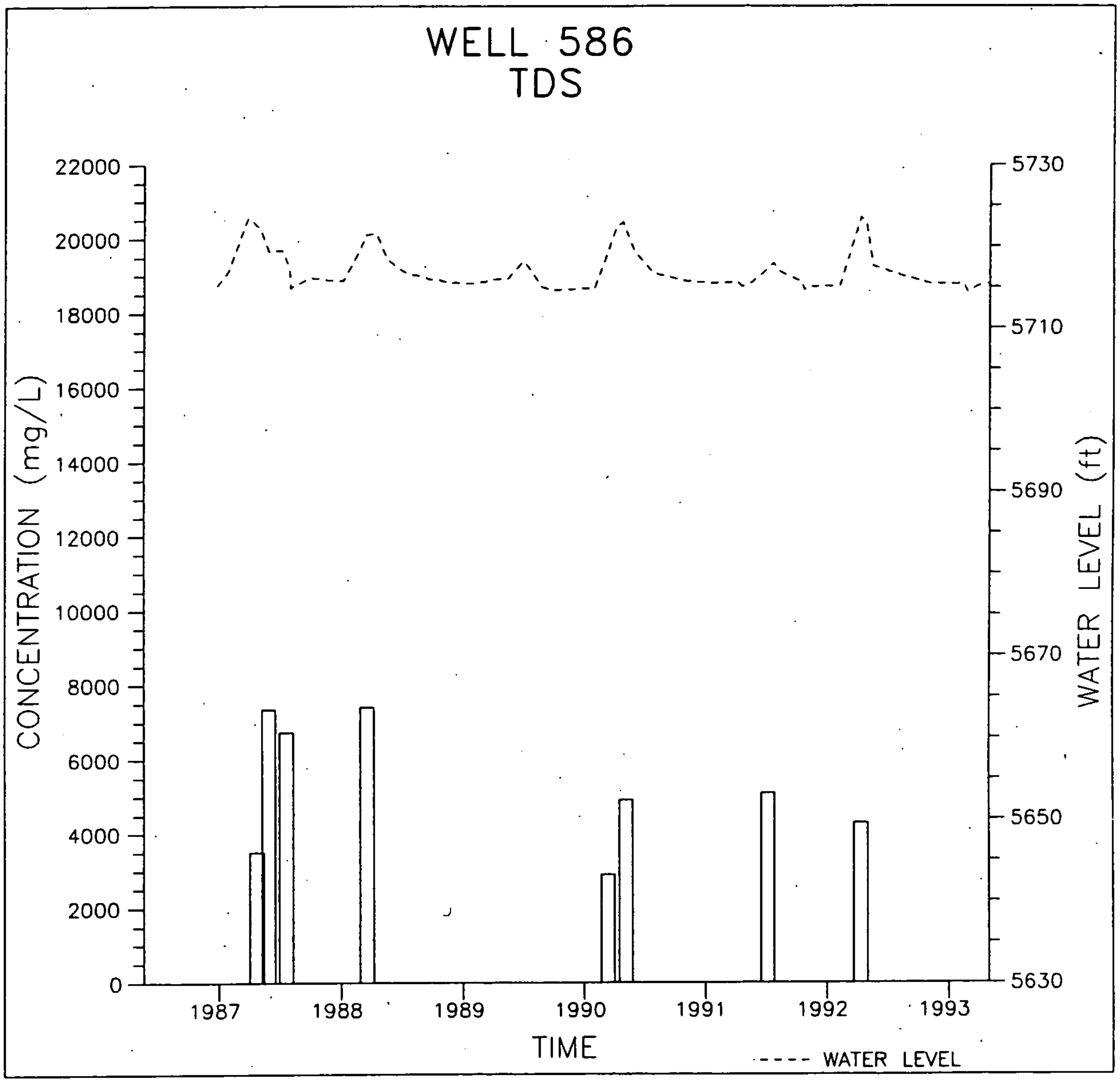
442



WELL 271
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

442

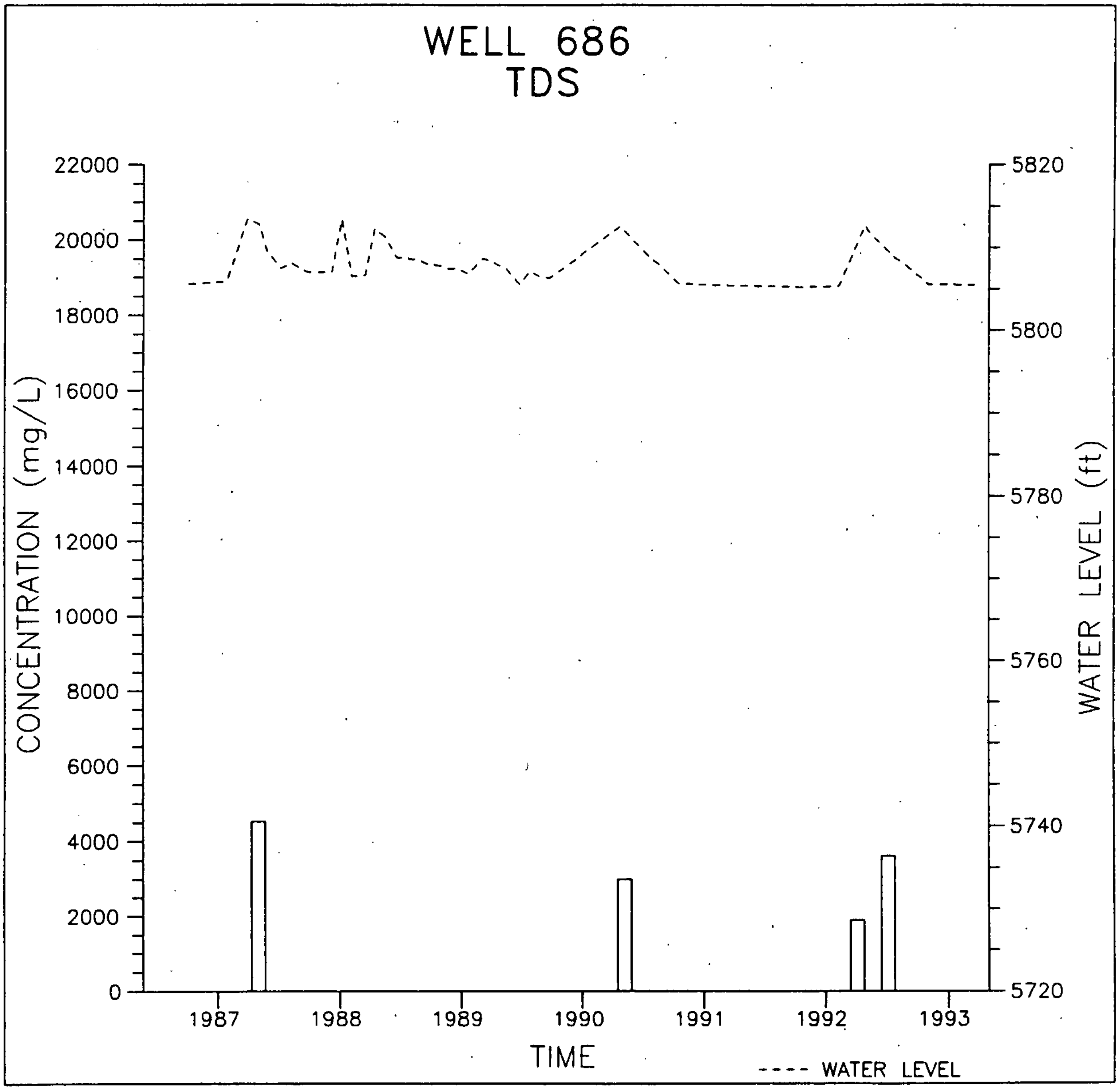
#443



WELL 586
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5730
5710
5690
5670
5650
5630
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

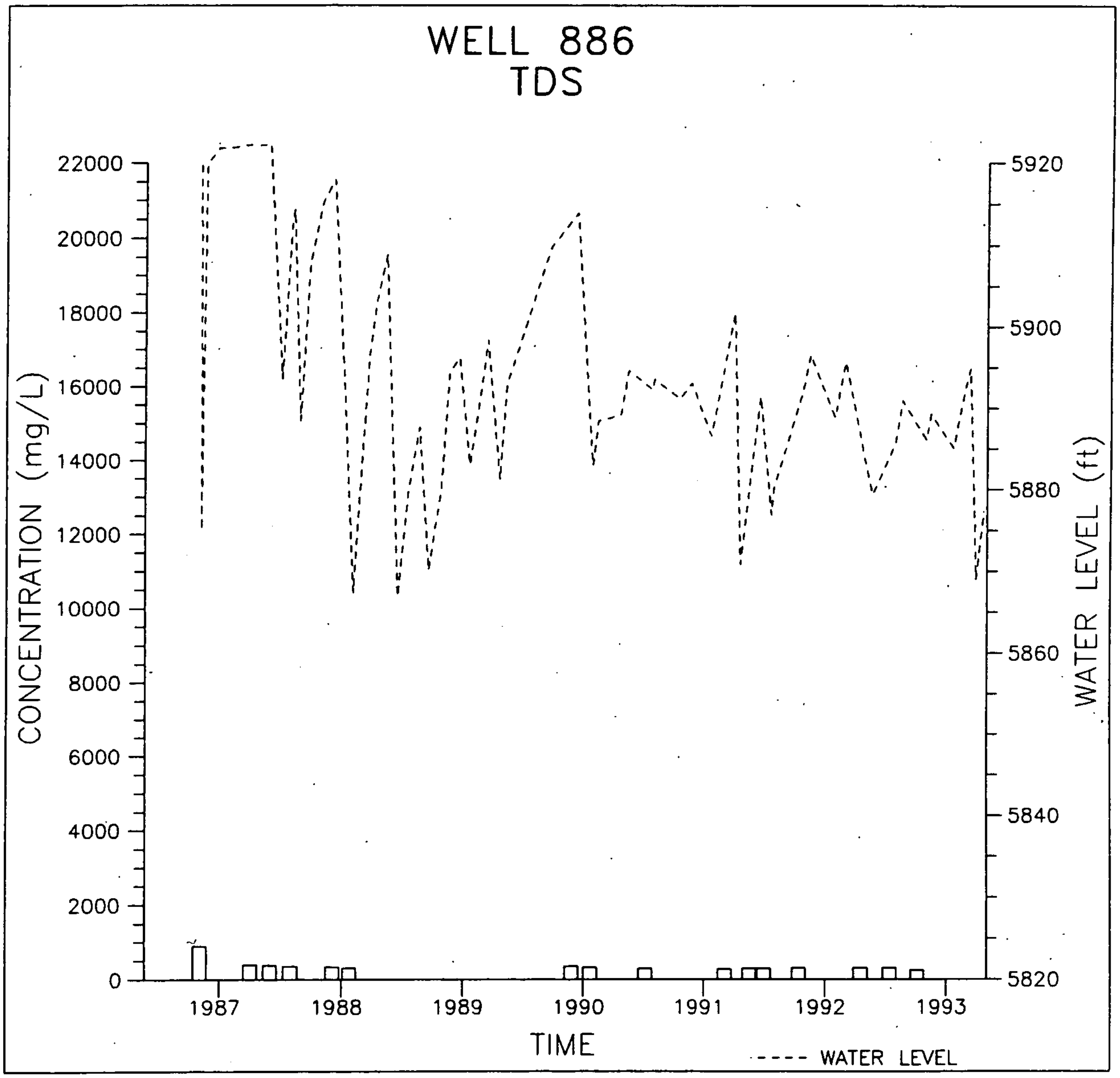
443

444


WELL 686
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5820
5800
5780
5760
5740
5720
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

445

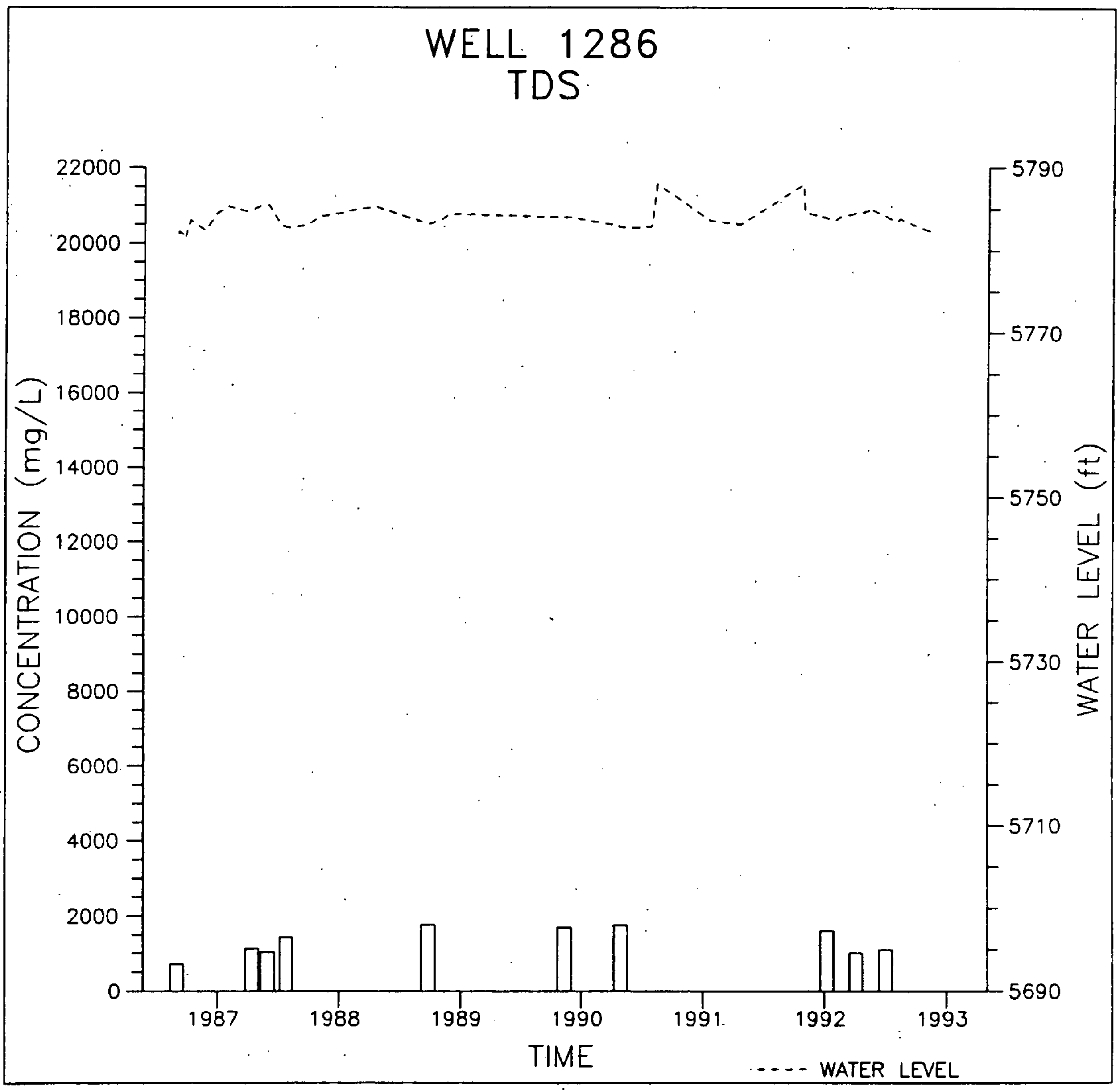
444



WELL 886
TDS
CONCENTRATION (mg/L)
WATER LEVEL (ft)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

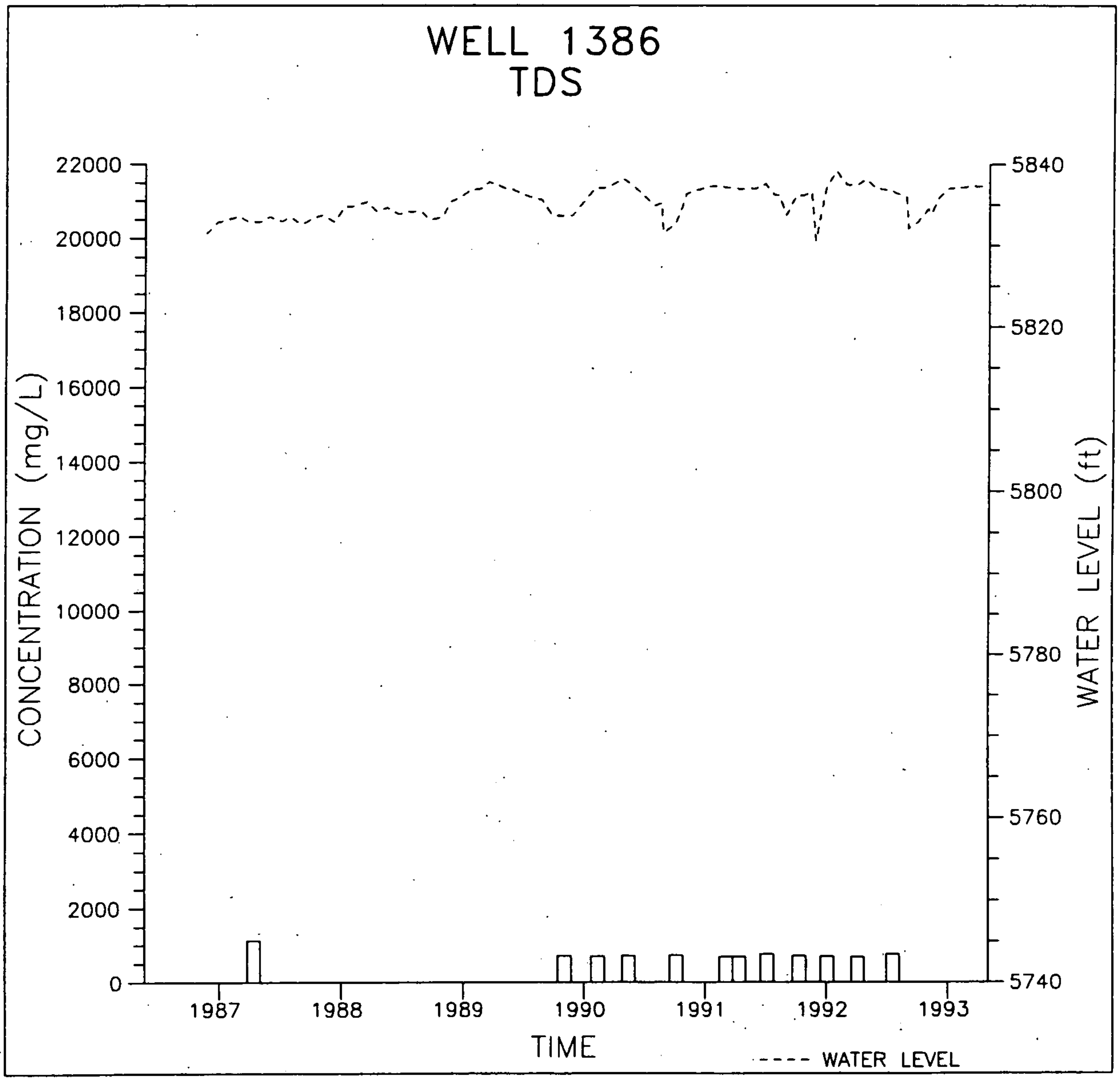
445

#16


WELL 1286
TDS
CONCENTRATION (mg/L)
WATER LEVEL (ft)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

446

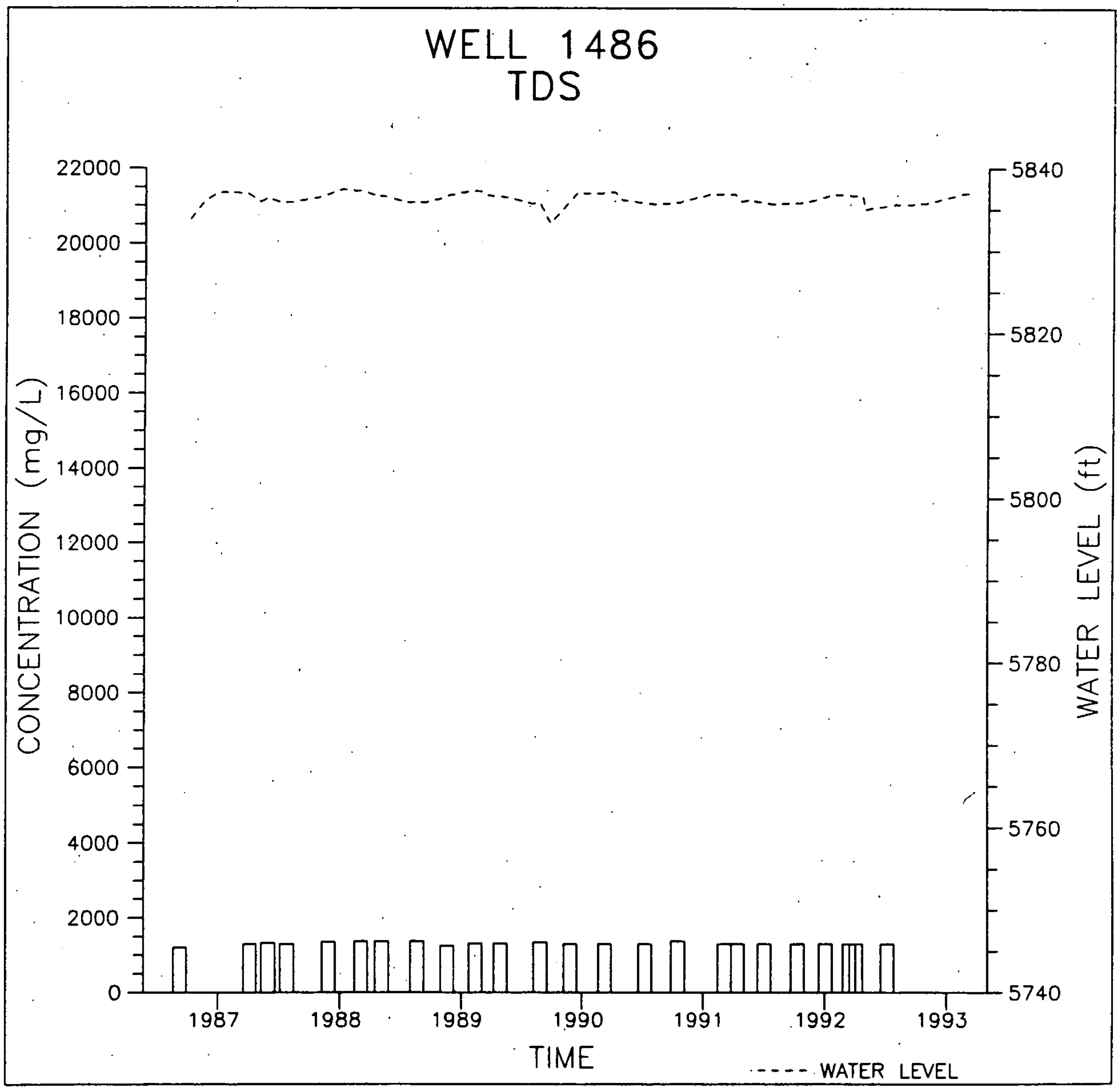
447



WELL 1386
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5840
5820
5800
5780
5760
5740
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

447

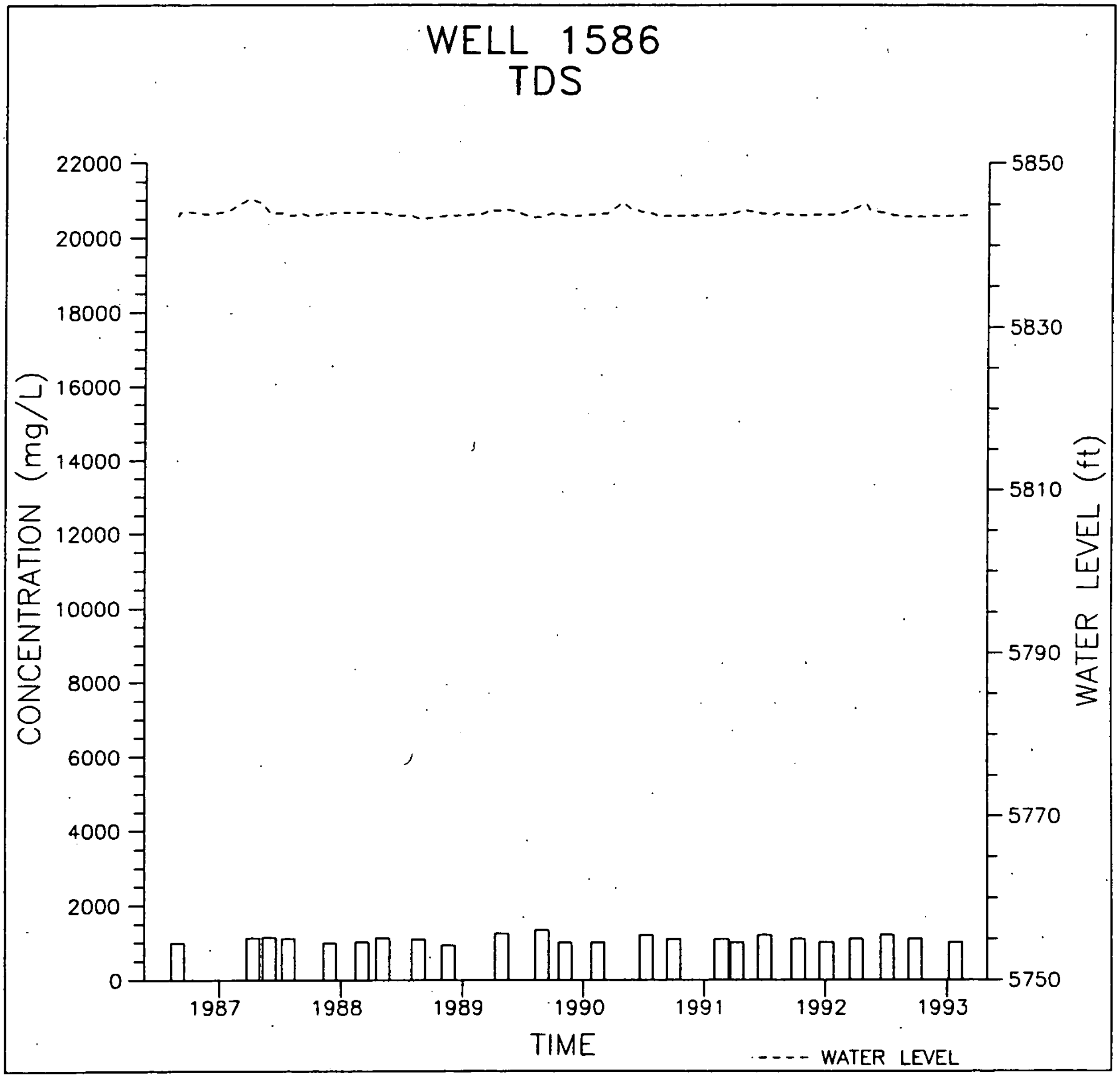
448



WELL 1486
TDS
CONCENTRATION (mg/L)
WATER LEVEL (ft)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5840
5820
5800
5780
5760
5740
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

449

448

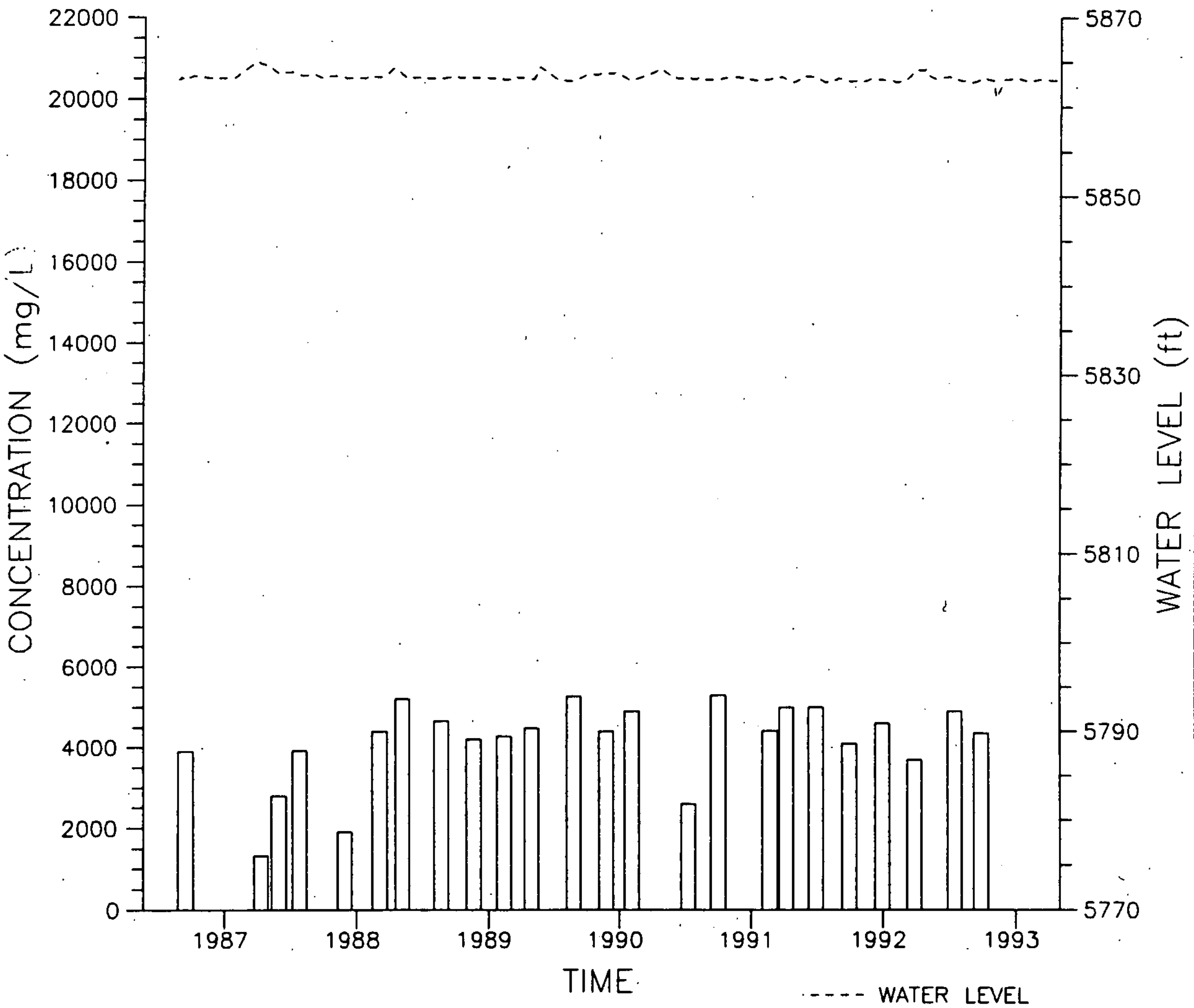


WELL 1586
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

449

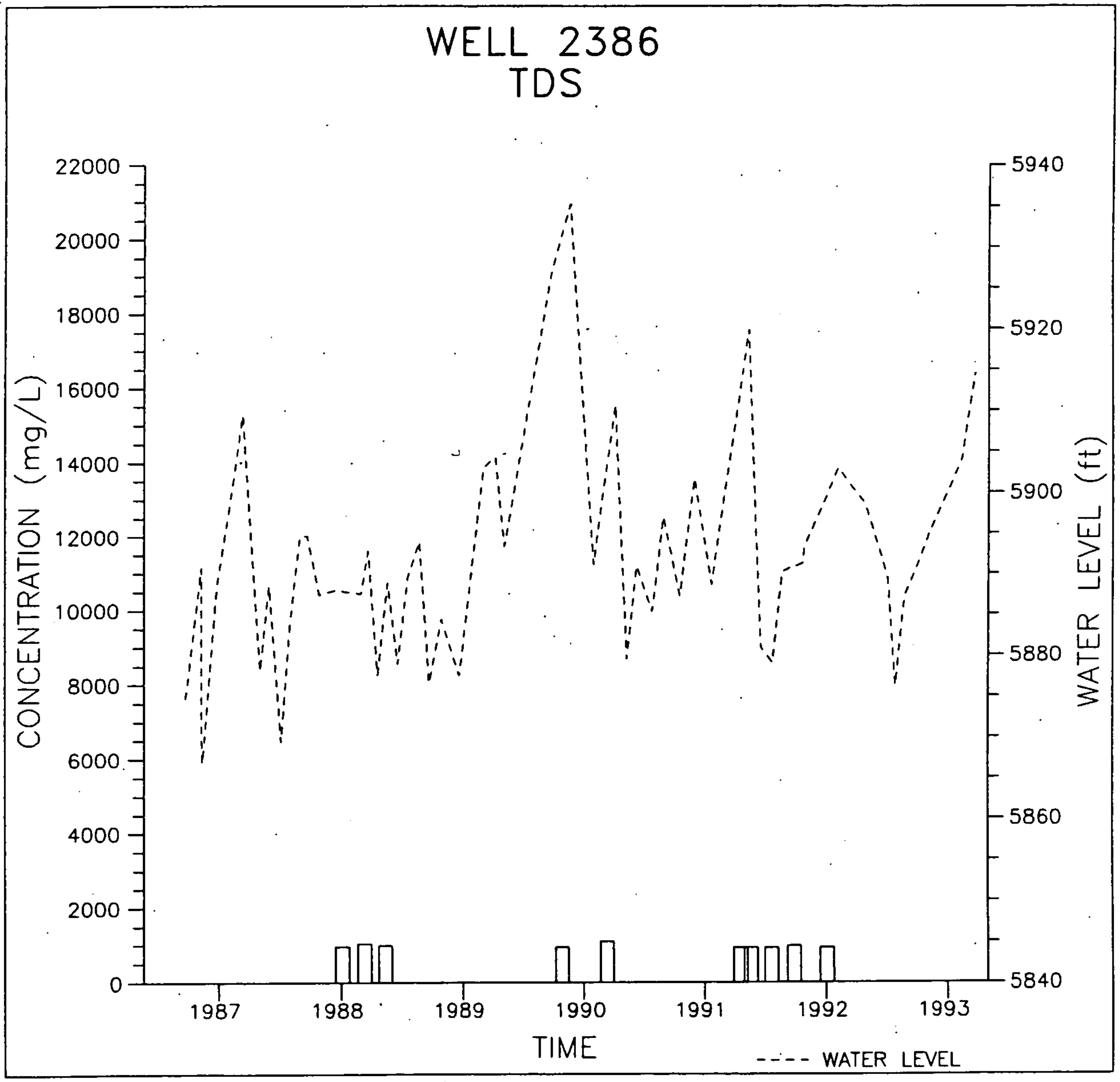
450

WELL 1786
TDS



450

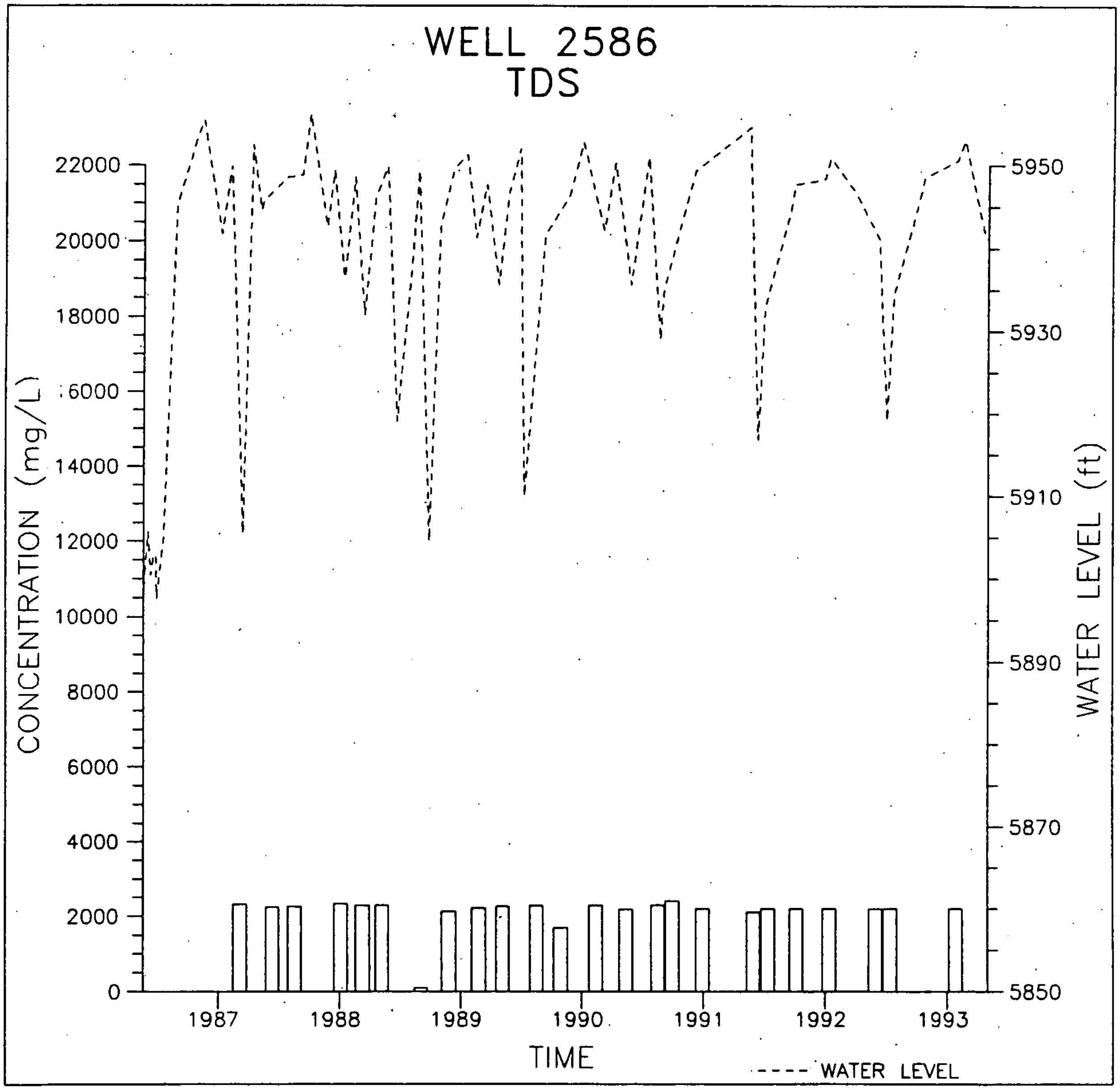
457



WELL 2386
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

451

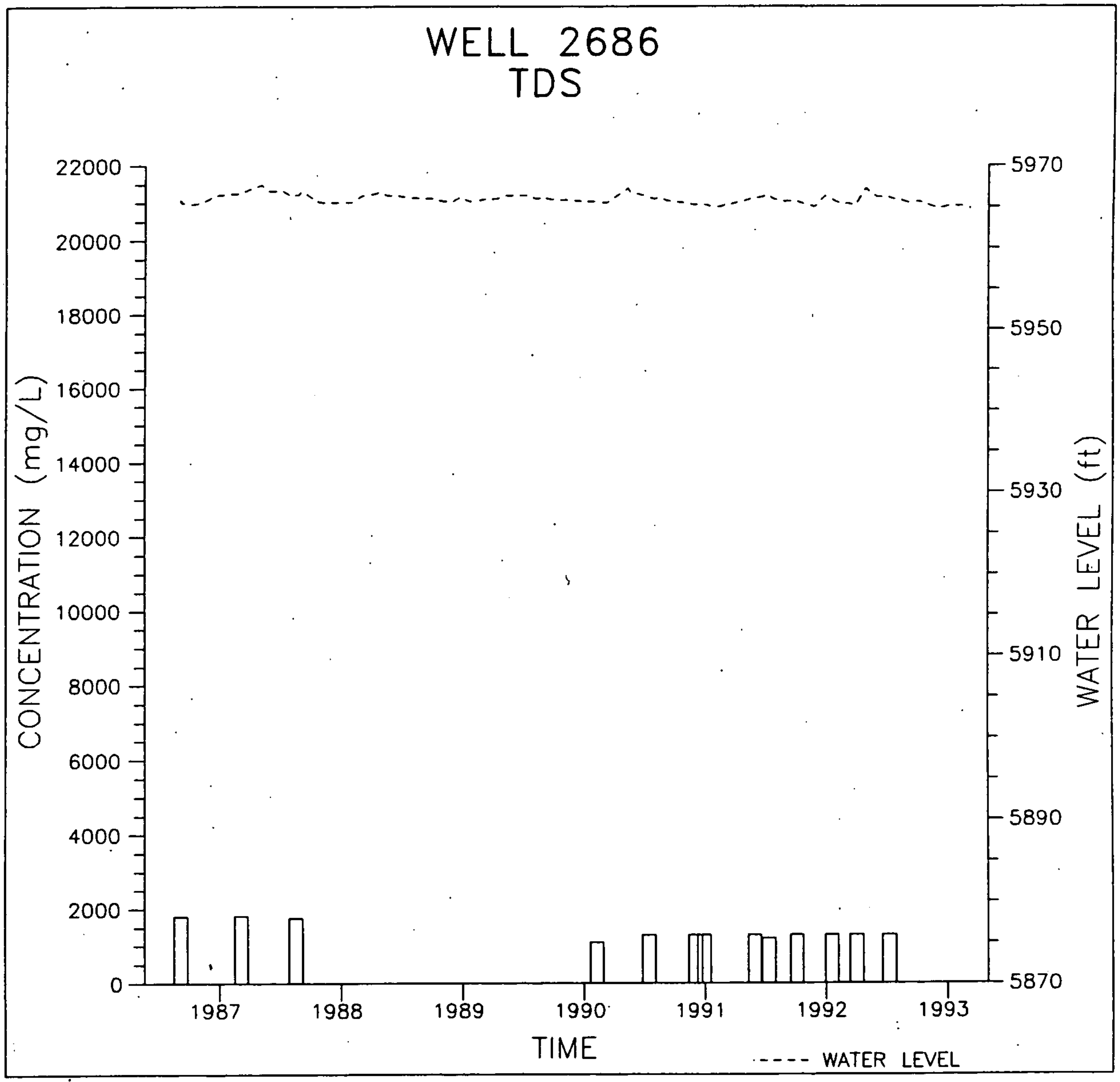
45



WELL 2586
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

452

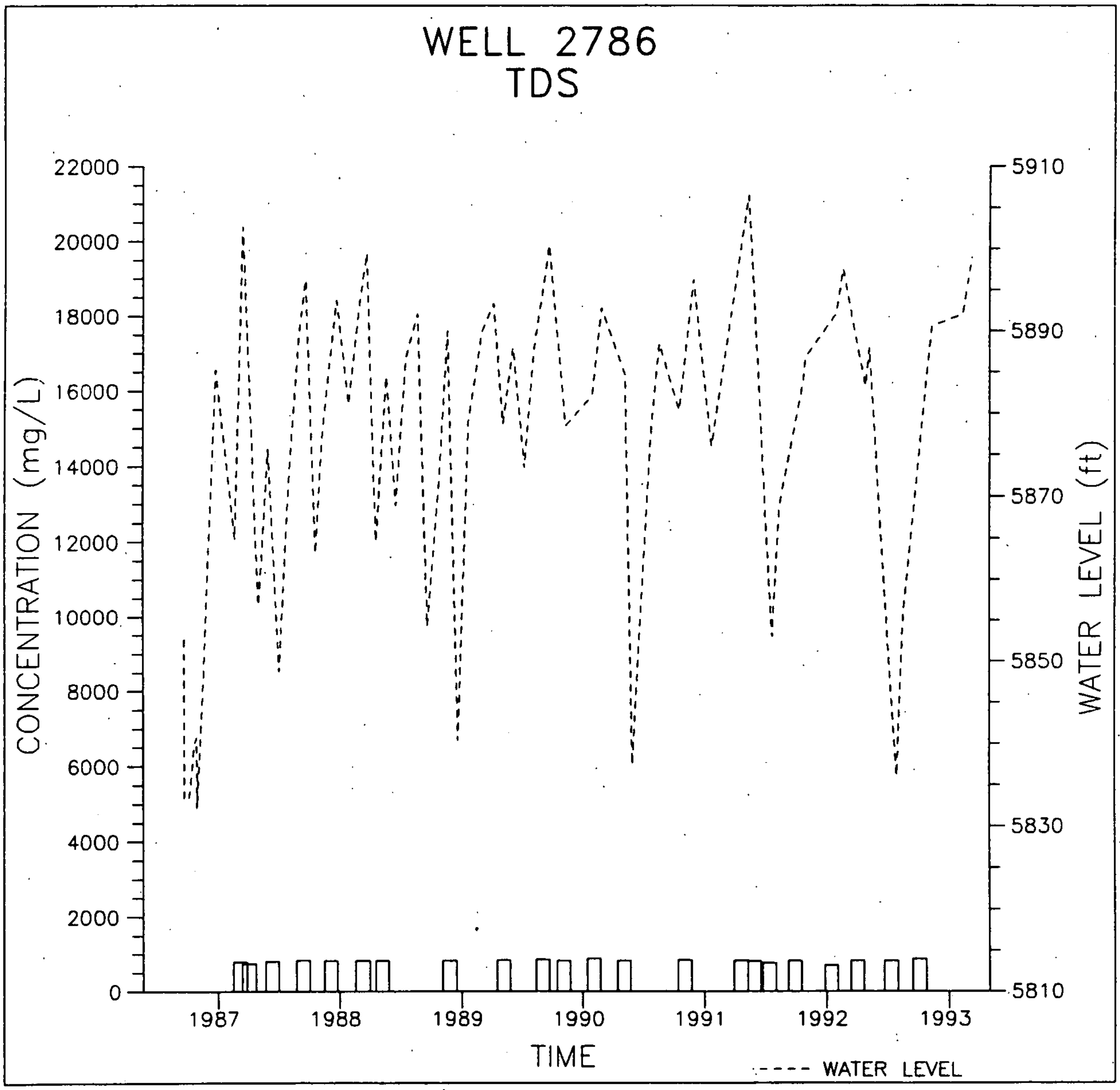
453



WELL 2686
TDS
CONCENTRATION (mg/L)
WATER LEVEL (ft)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

453

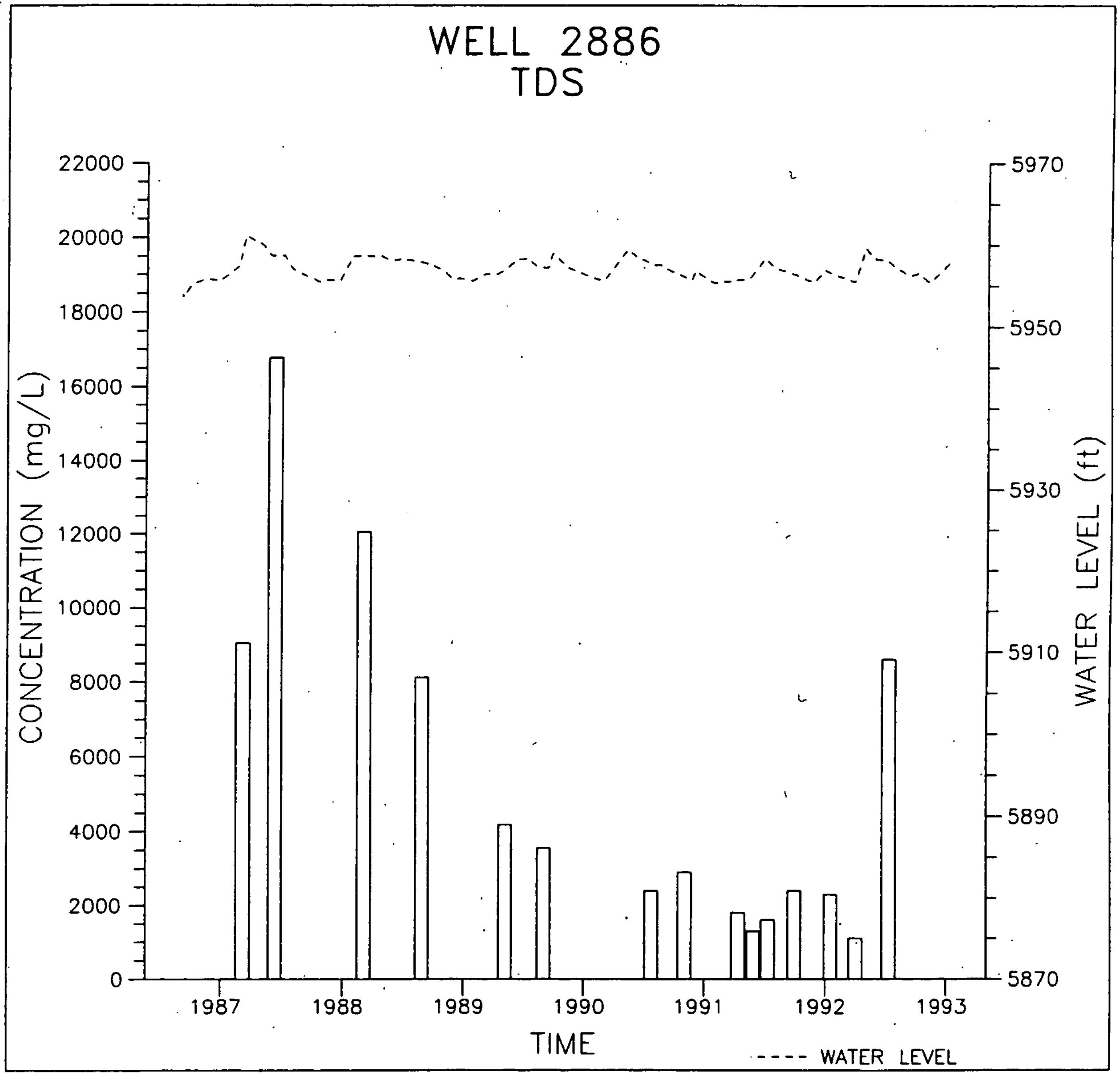
454



WELL 2786
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

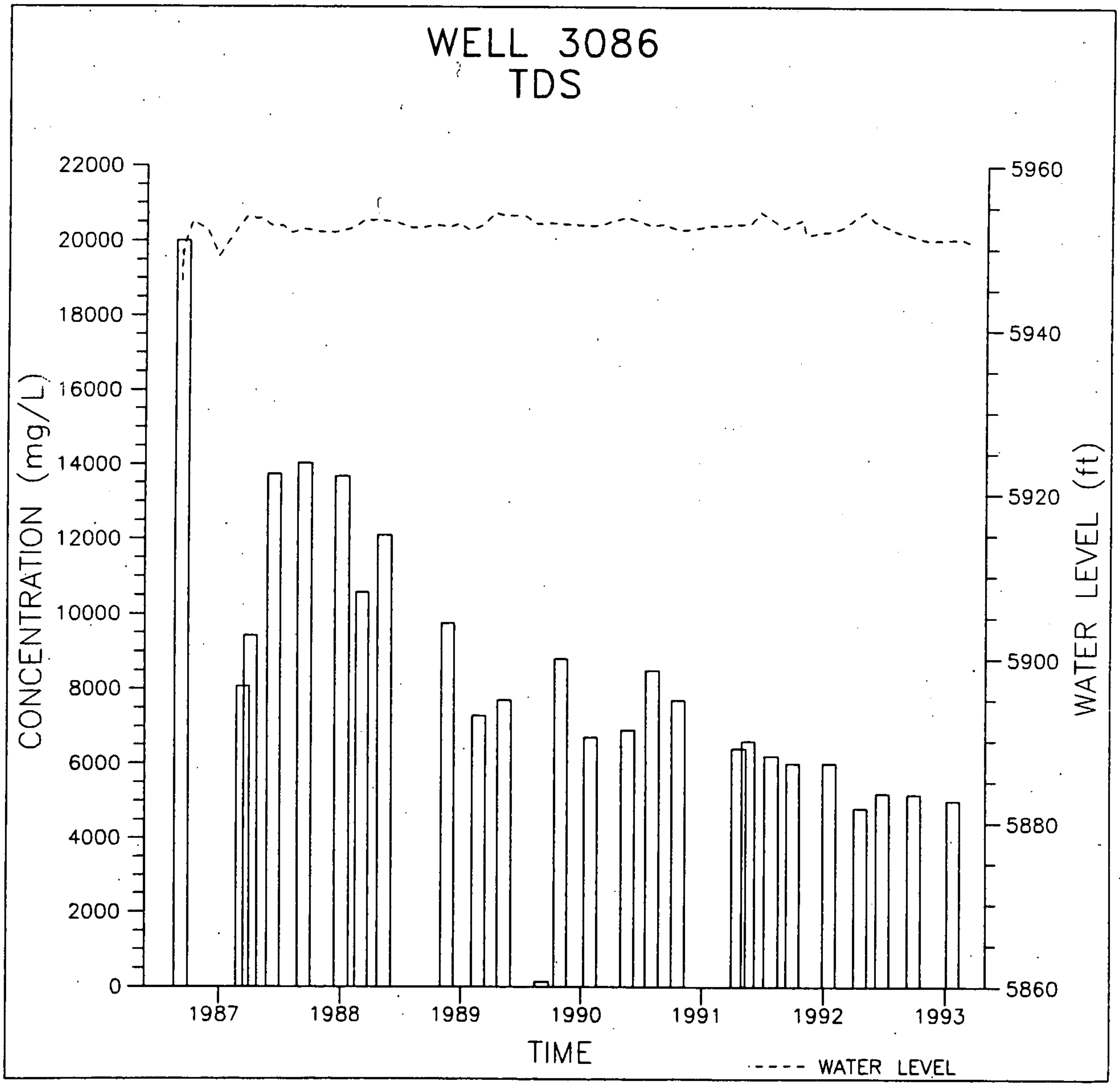
454

455


WELL 2886
TDS
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
CONCENTRATION (mg/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

455

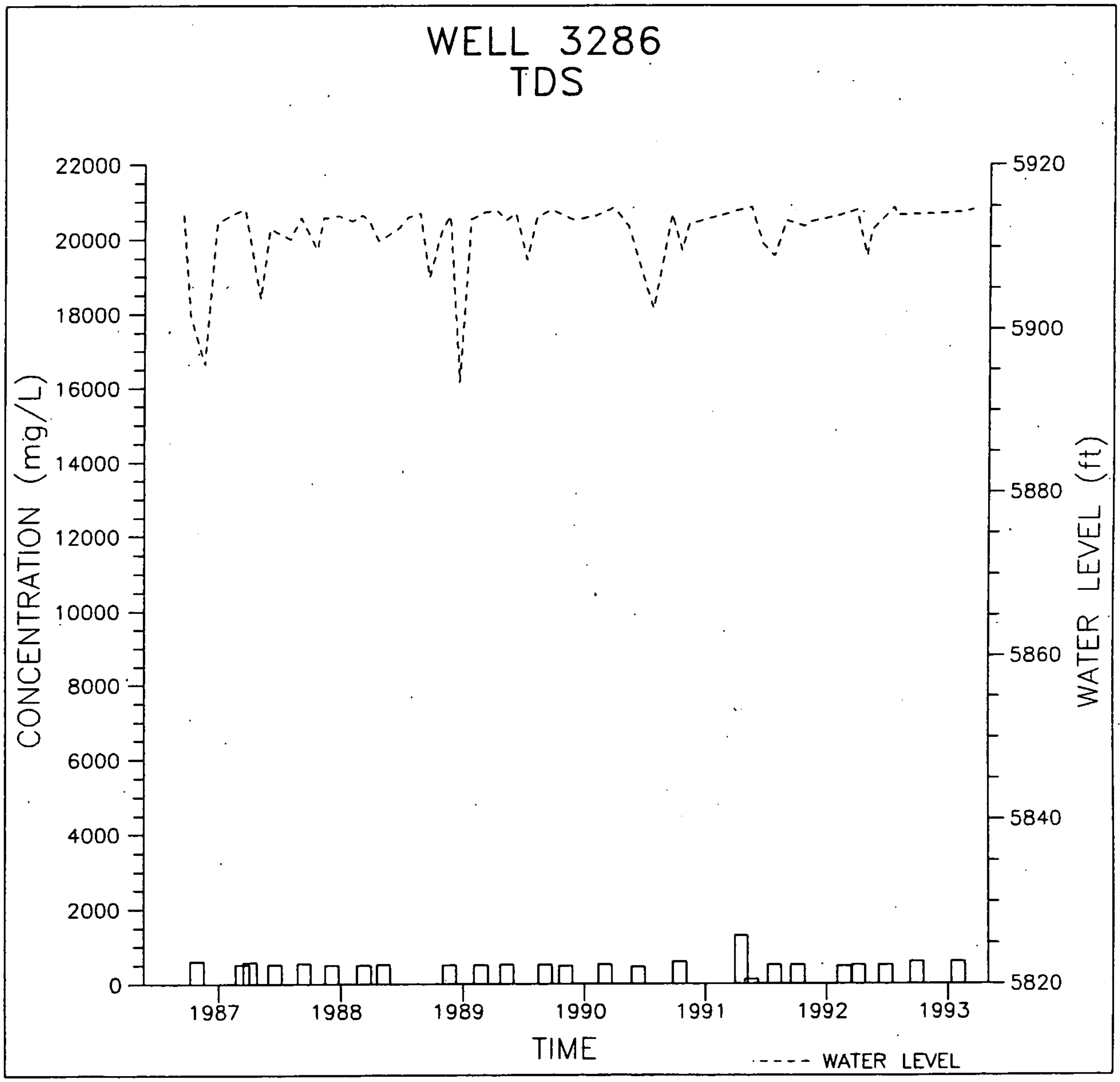
450



WELL 3086
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

456

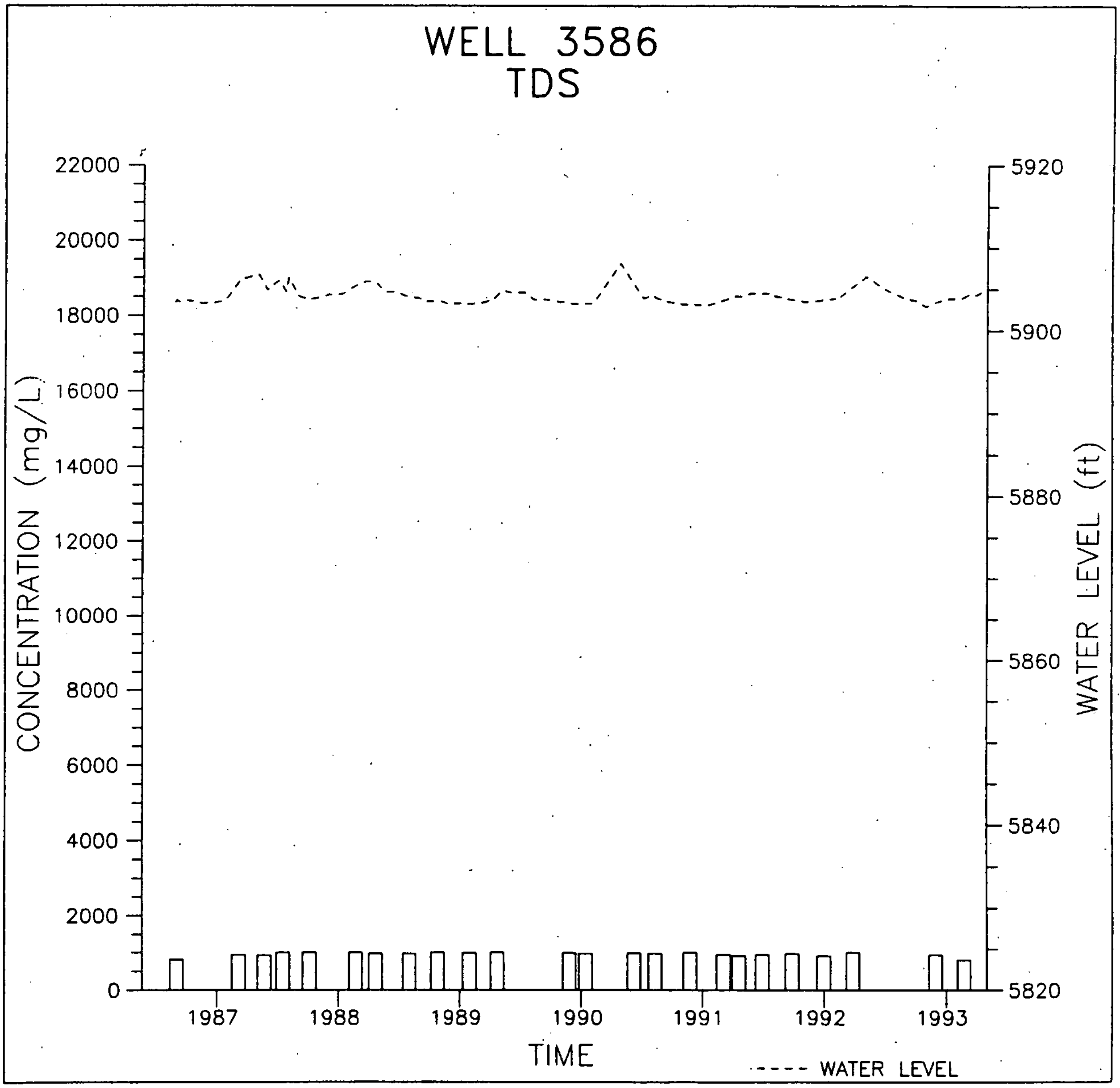
457



WELL 3286
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

457

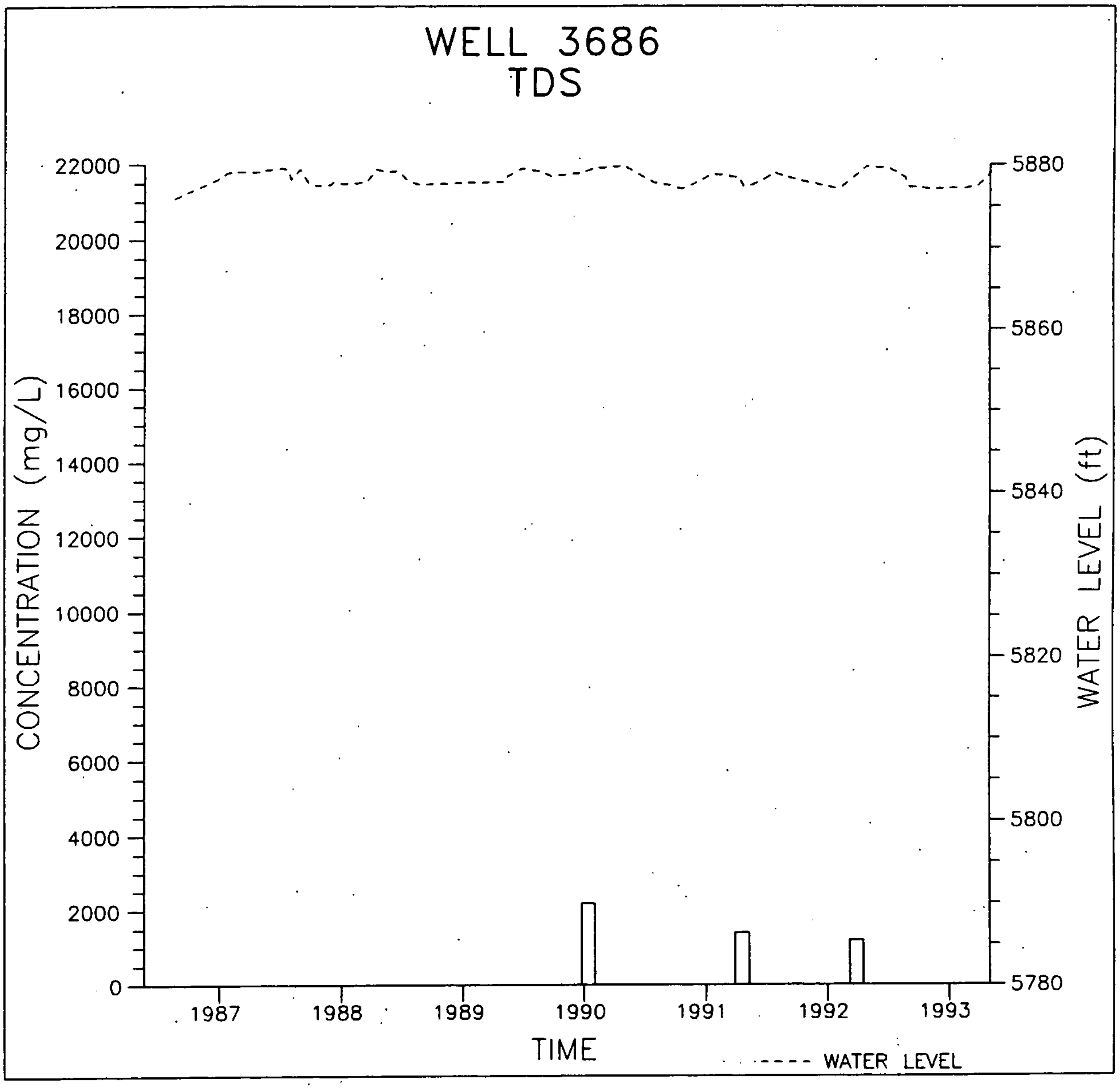
458



WELL 3586
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5920
5900
5880
5860
5840
5820
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

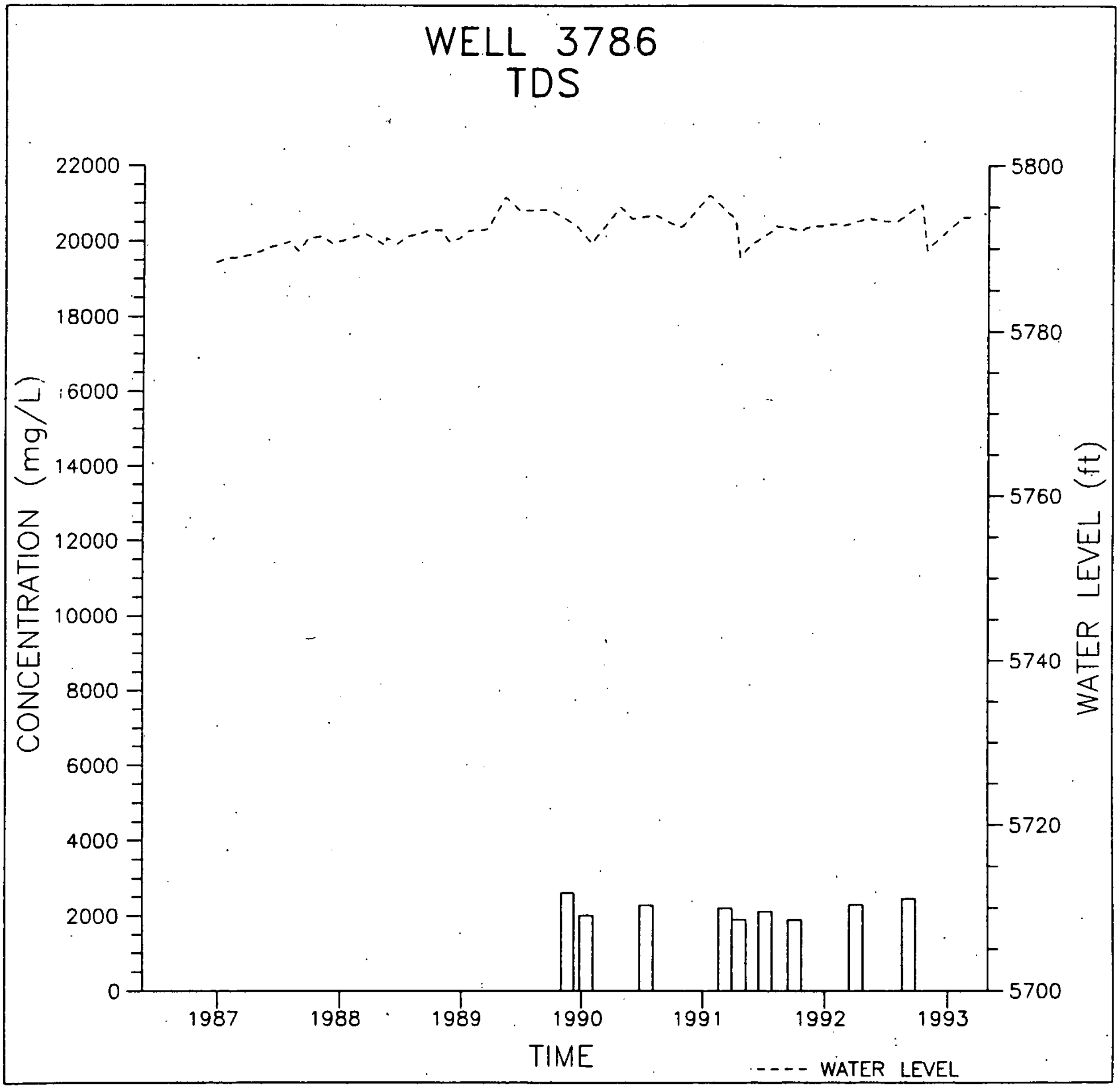
458

459


WELL 3686
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

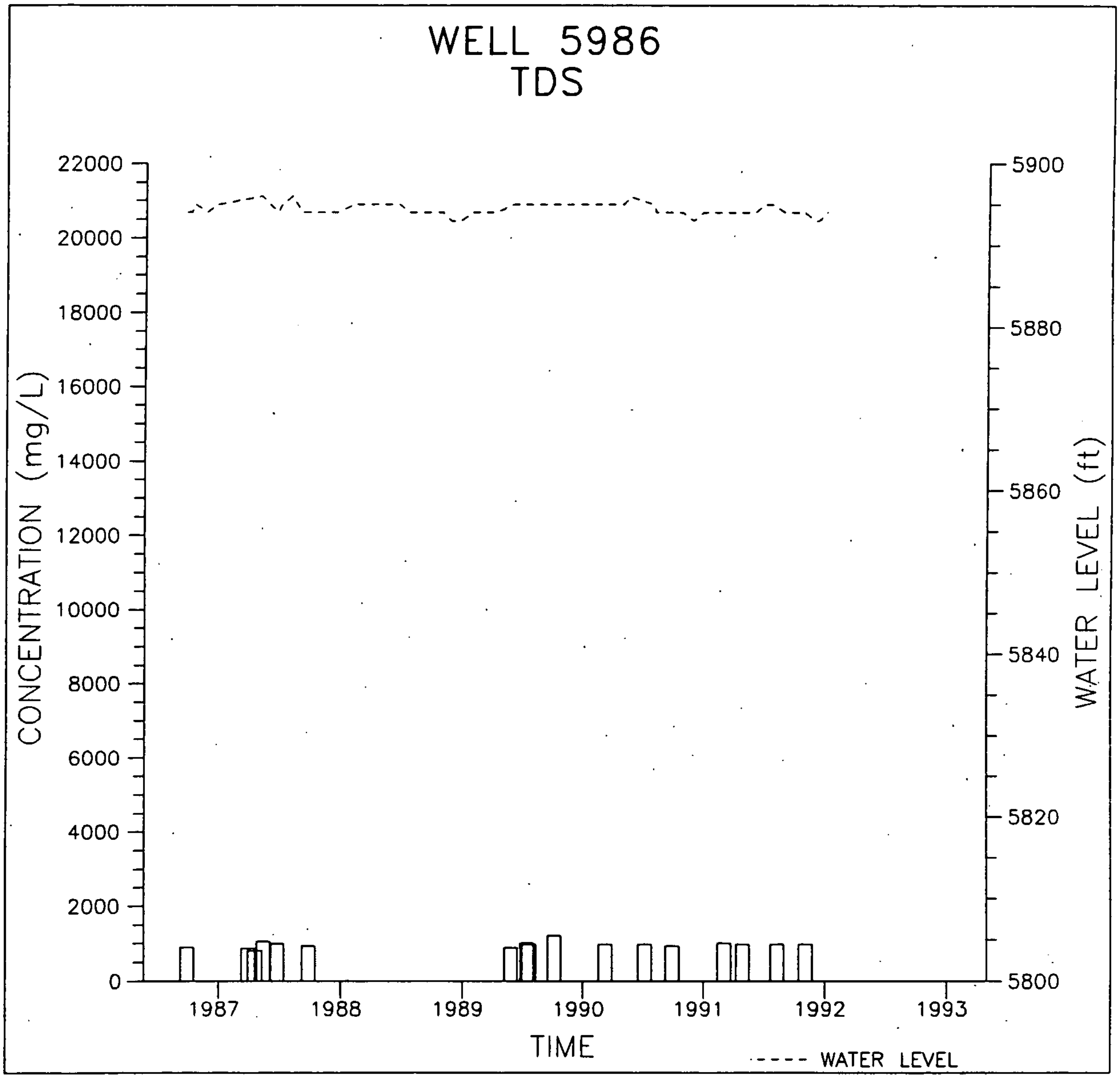
459

460



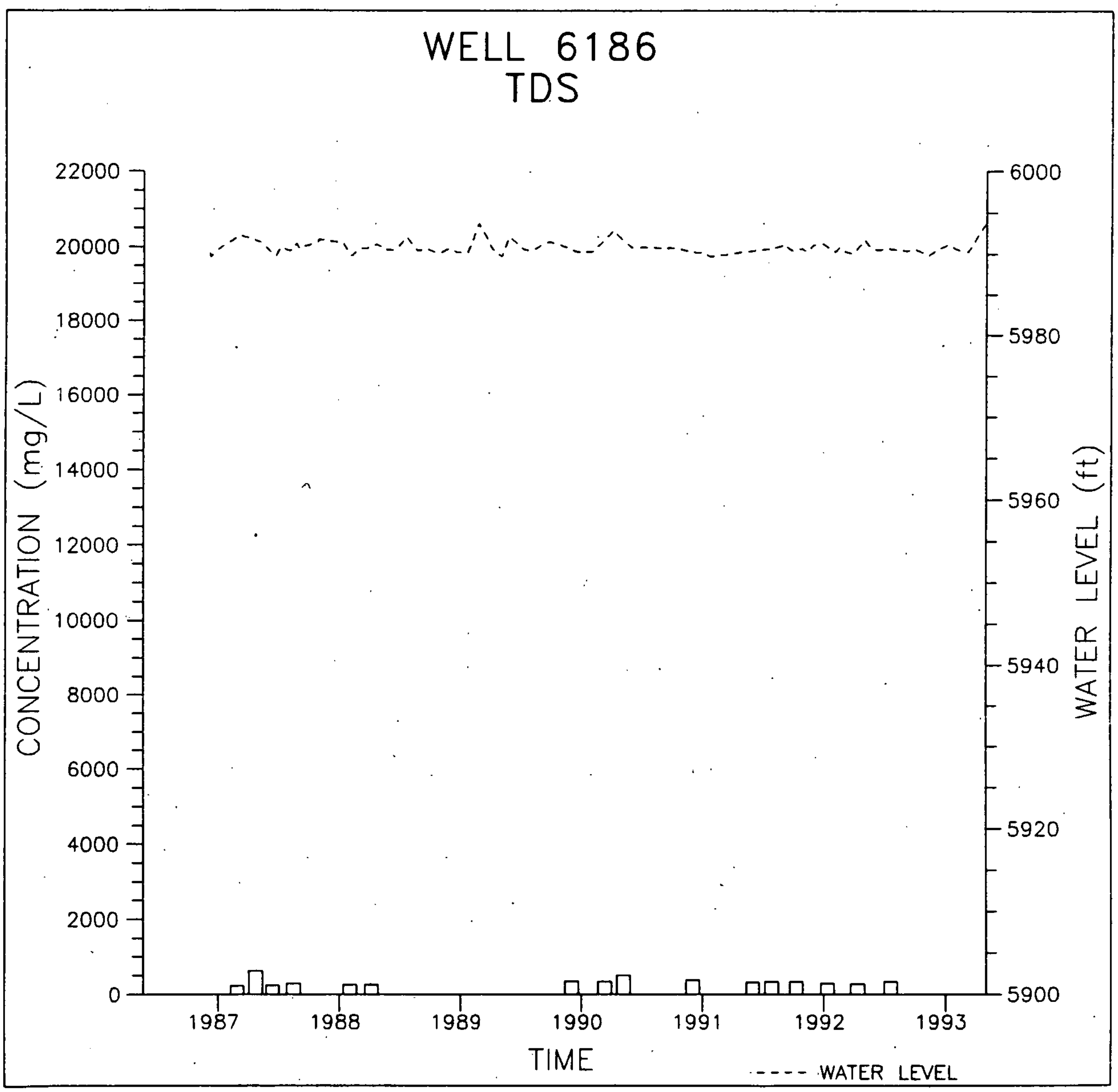
WELL 3786
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5800
5780
5760
5740
5720
5700
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

460


WELL 5986
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

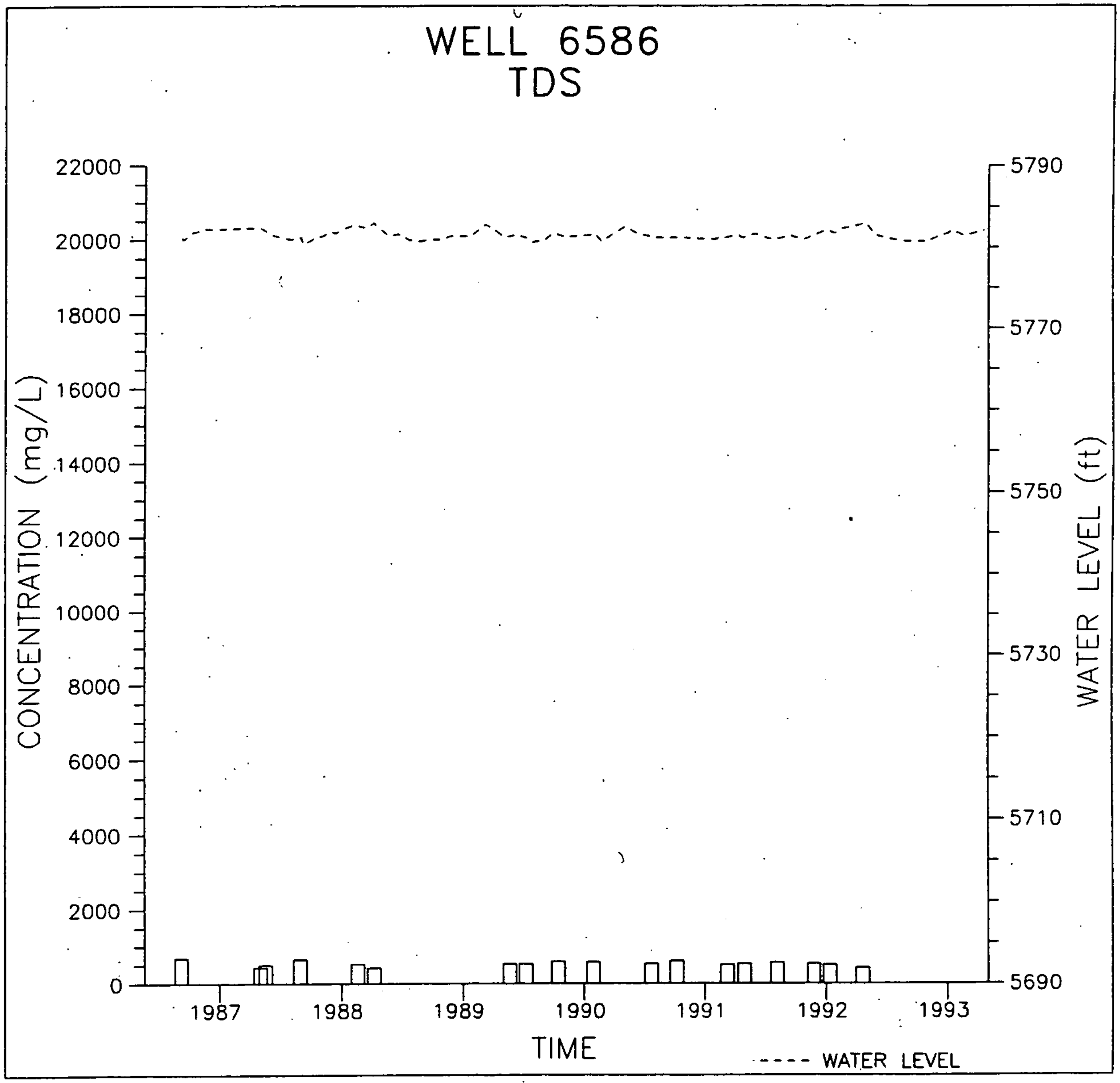
461

462



WELL 6186
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
6000
5980
5960
5940
5920
5900
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

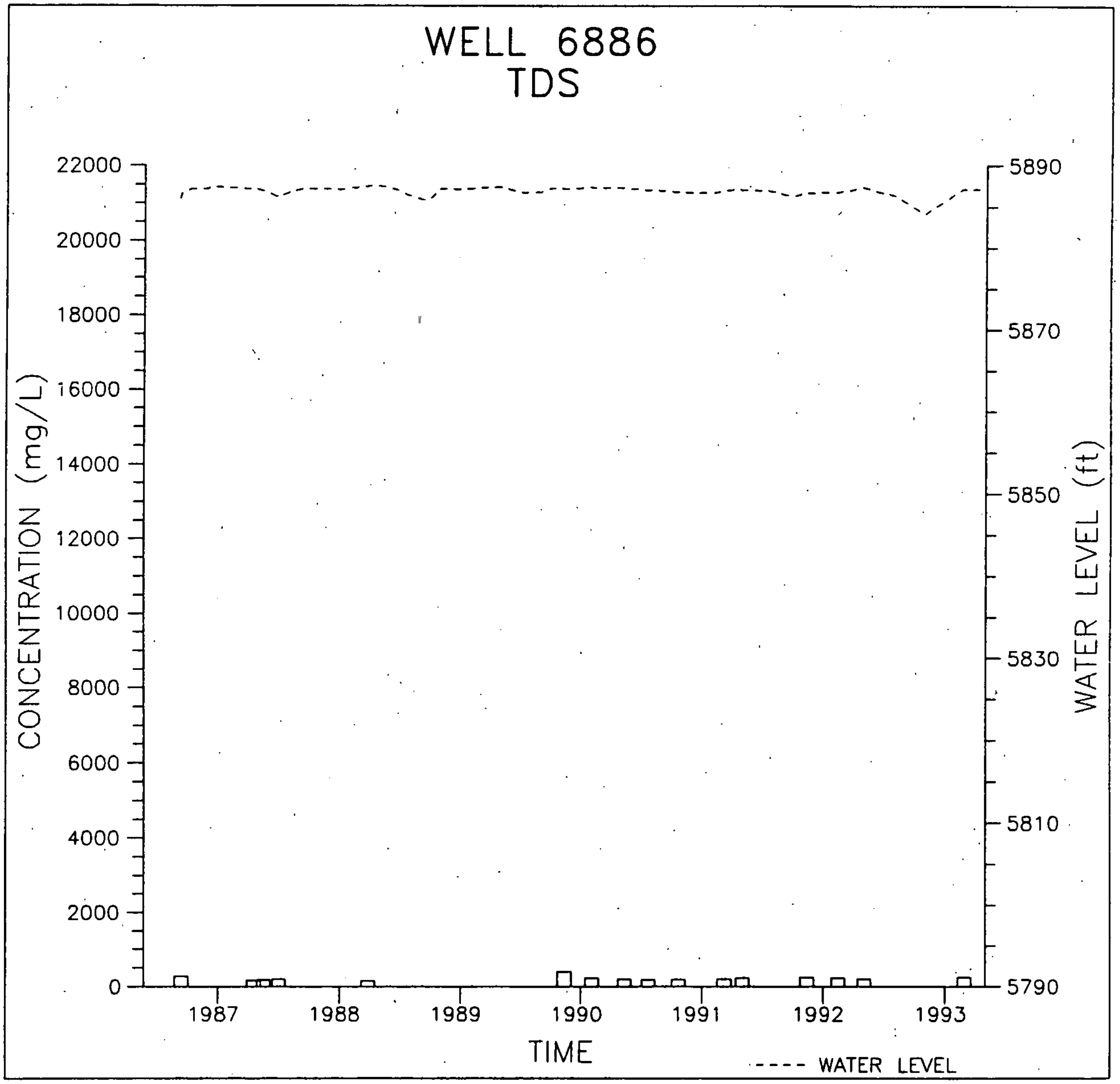
462



WELL 6586
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

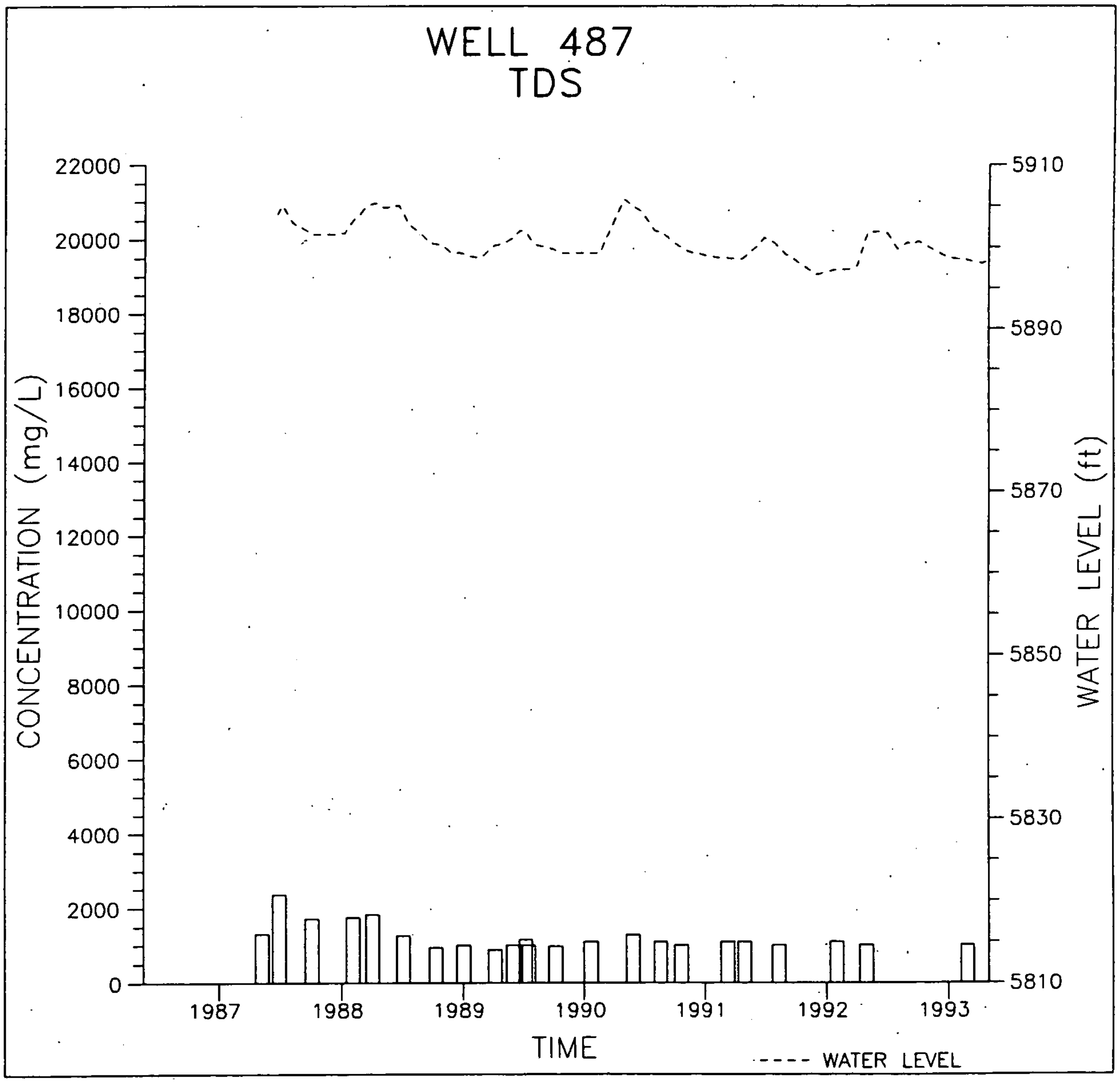
463

464


WELL 6886
TDS
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
CONCENTRATION (mg/L)
5890
5870
5850
5830
5810
5790
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

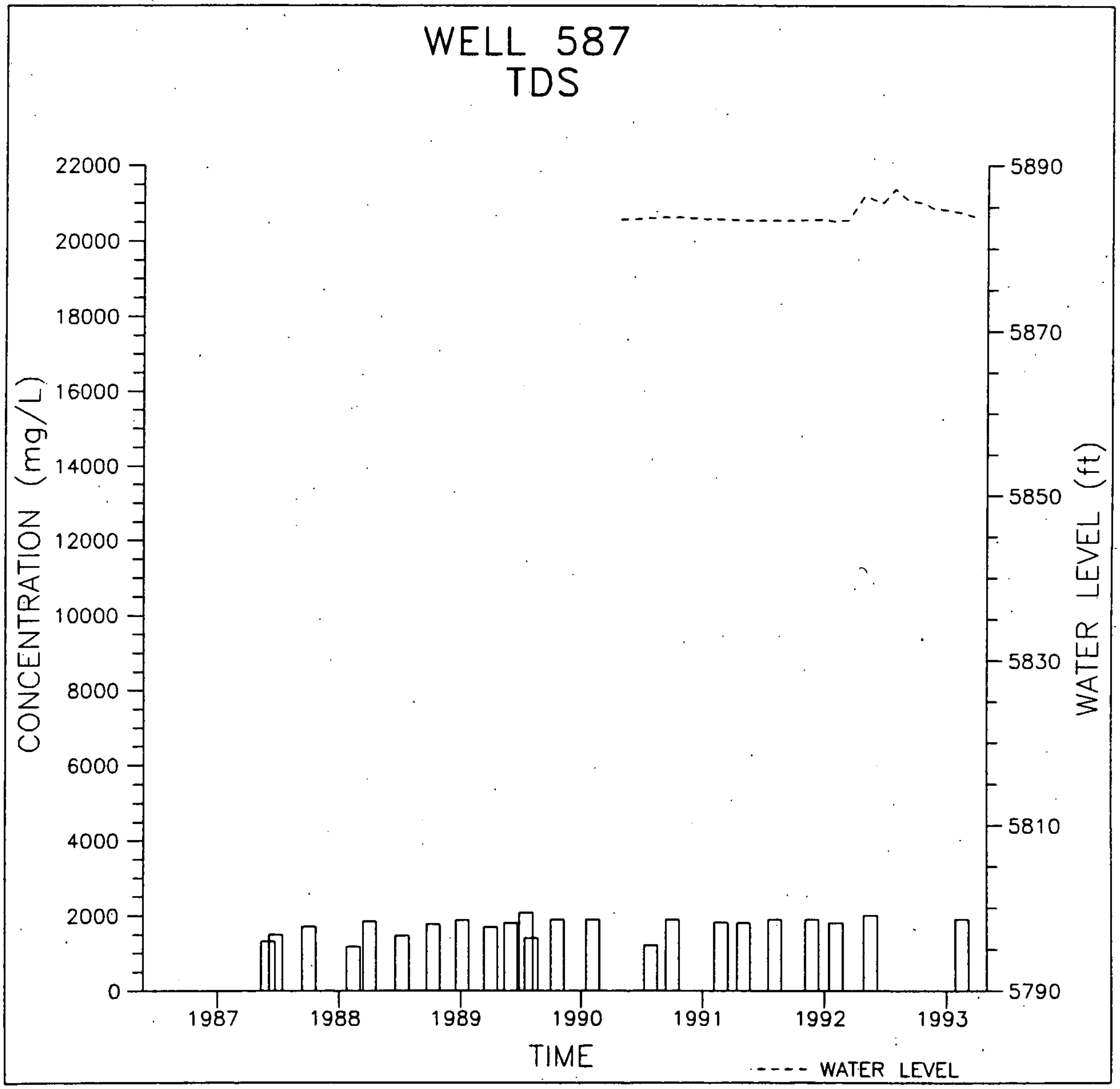
465

464


WELL 487
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

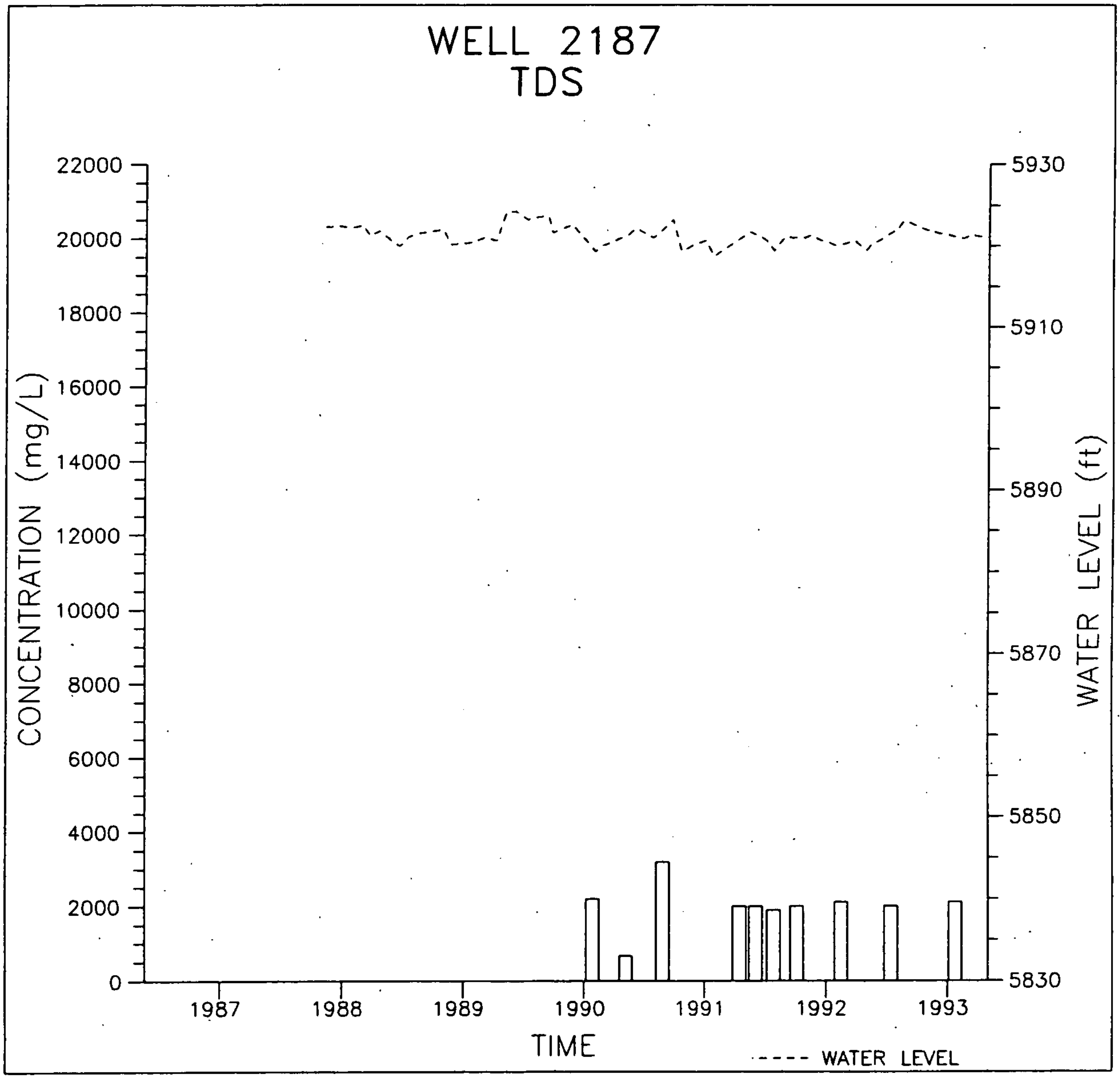
465

466


WELL 587
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

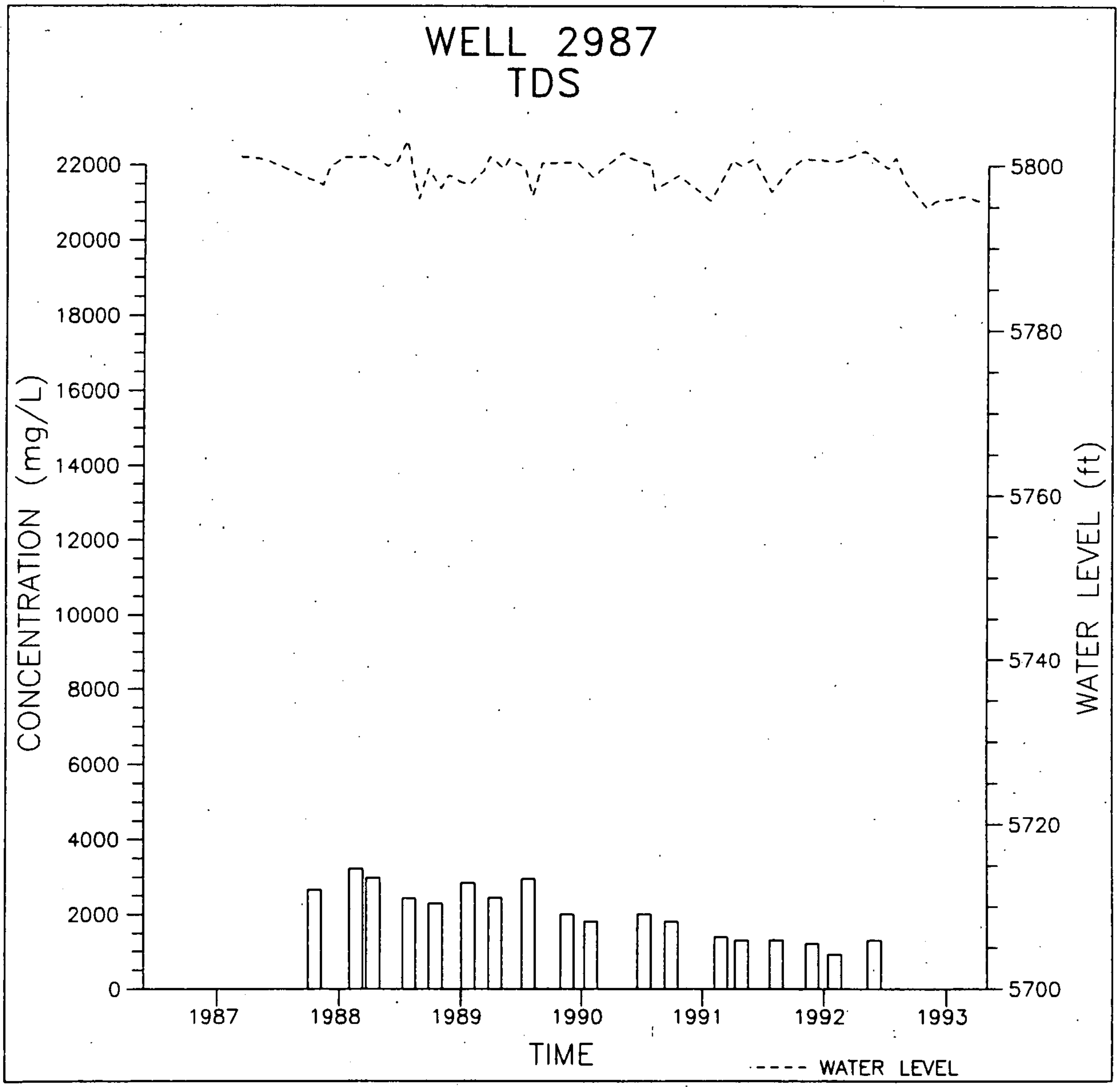
~~468~~ 467

466

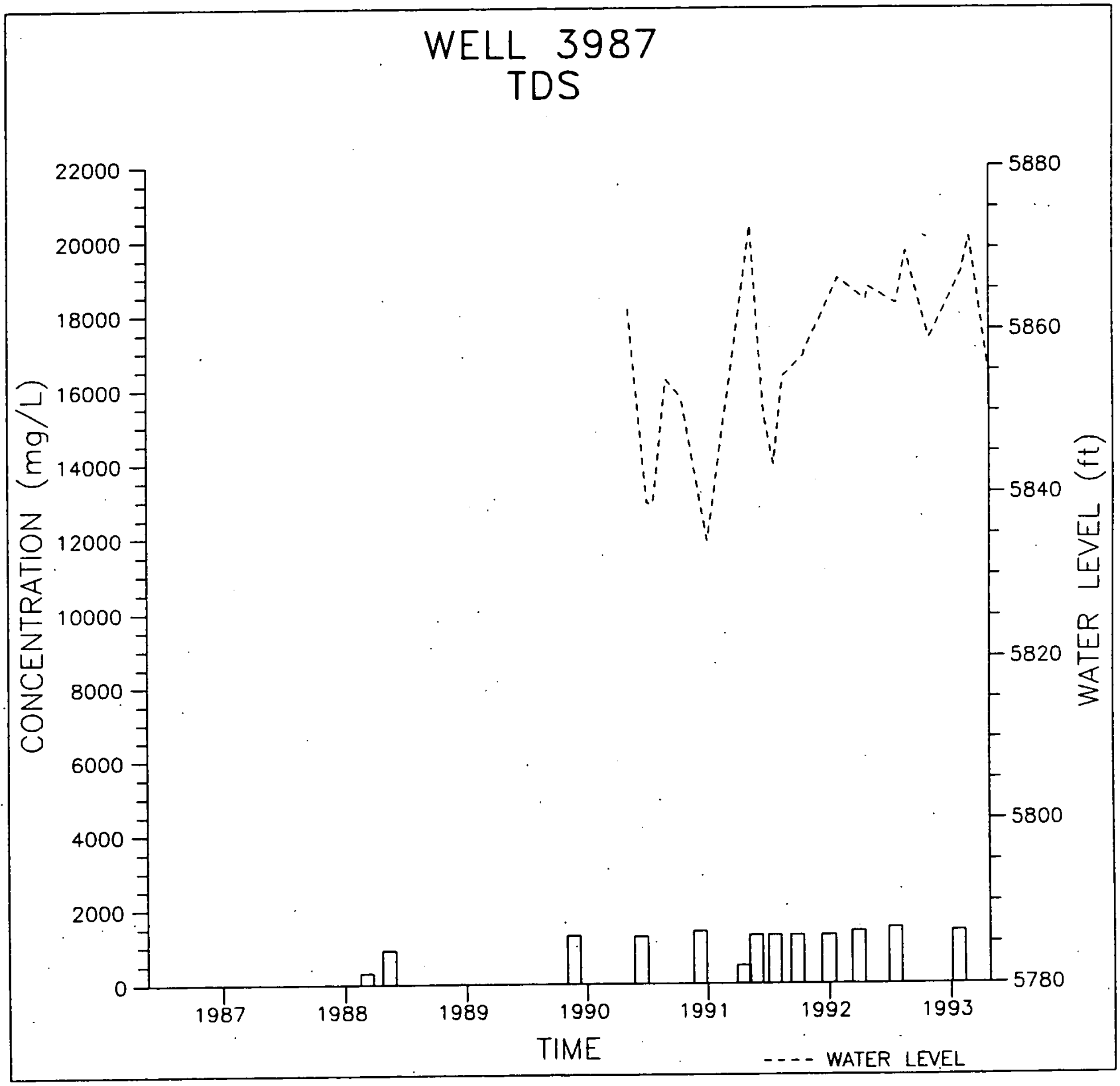

WELL 2187
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

467

468


WELL 2987
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5800
5780
5760
5740
5720
5700
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

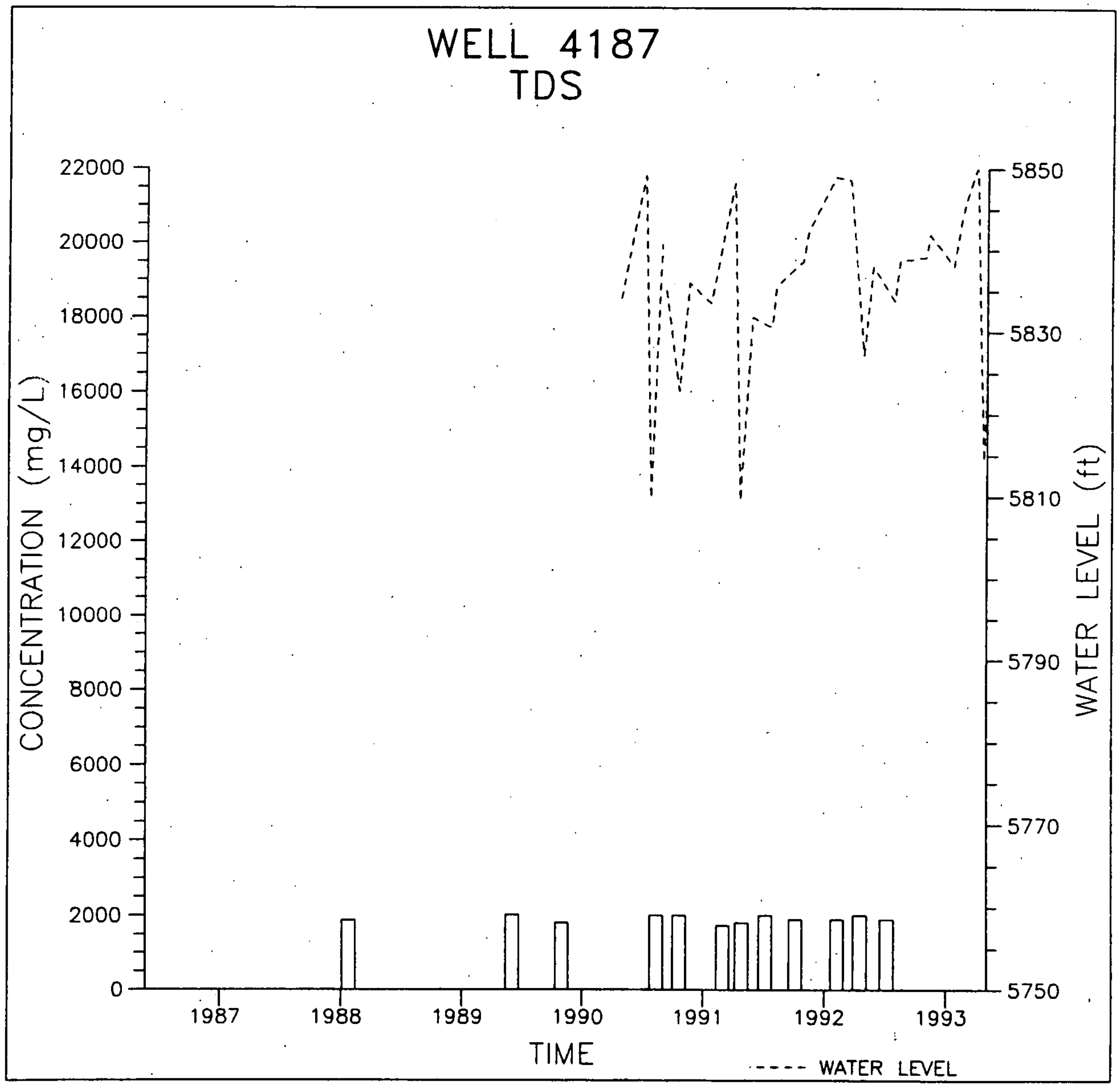
468



WELL 3987
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5880
5860
5840
5820
5800
5780
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

469

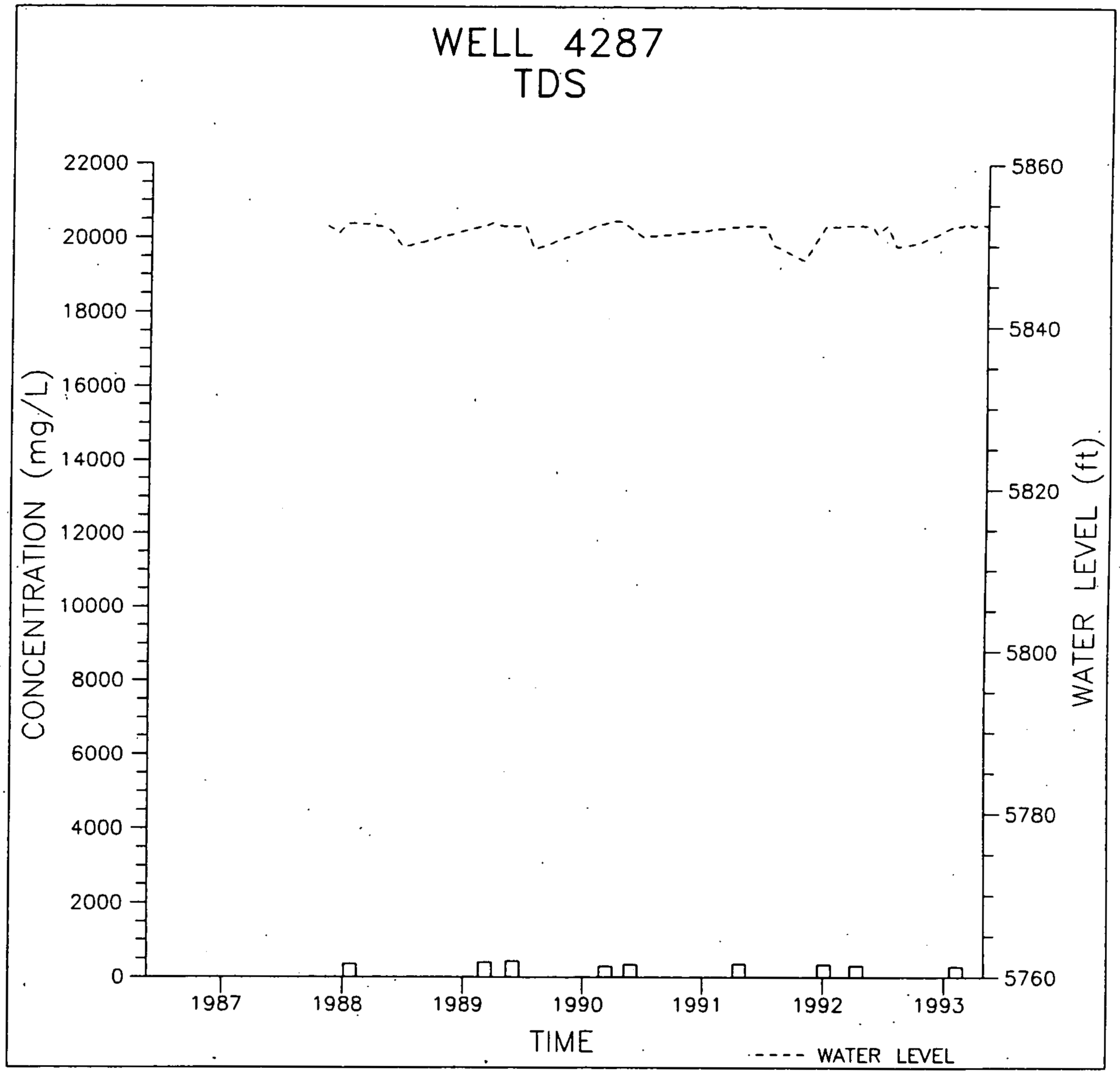
470



WELL 4187
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

470

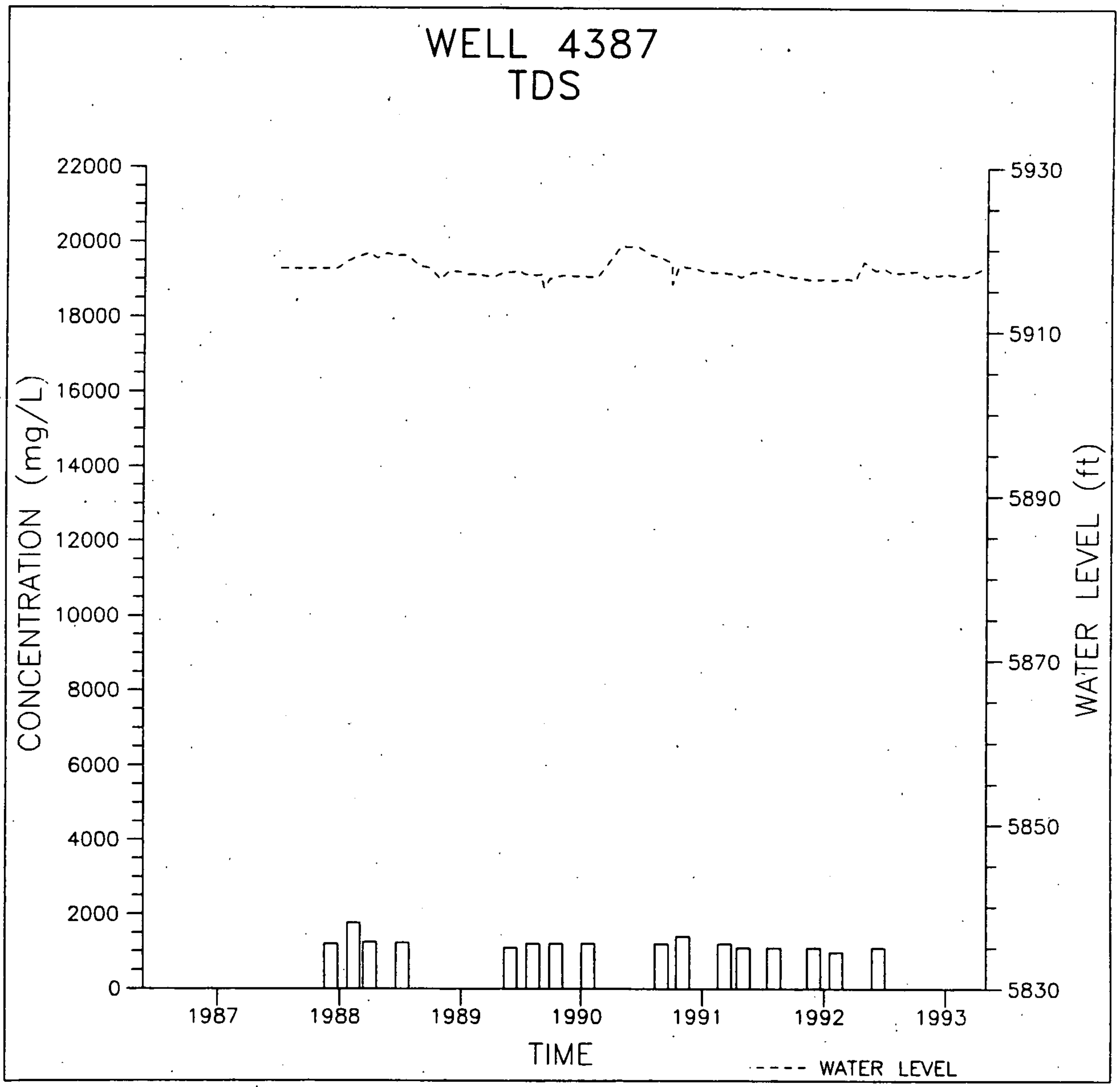
#71



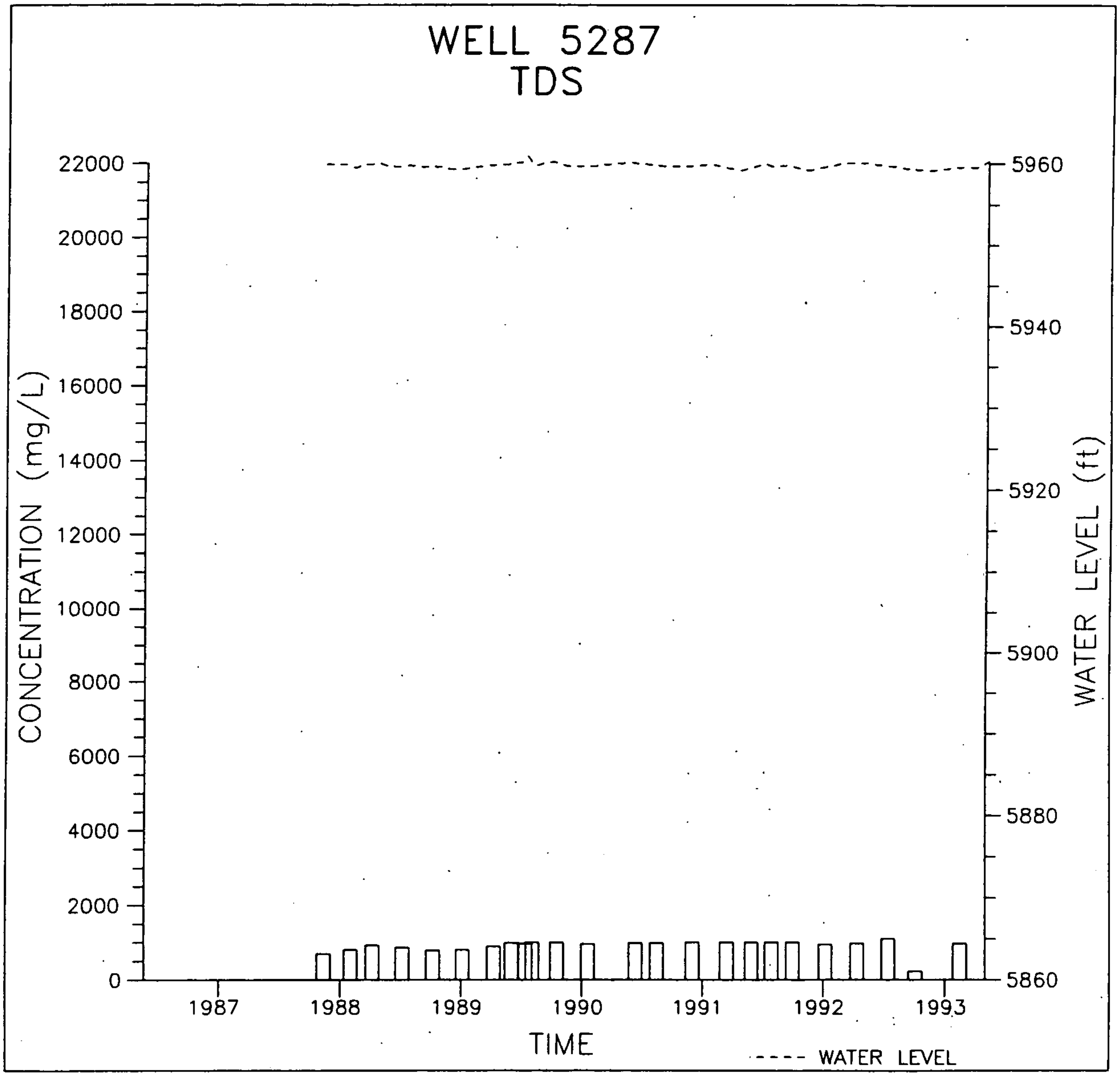
WELL 4287
TDS
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
CONCENTRATION (mg/L)
5860
5840
5820
5800
5780
5760
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

471

472

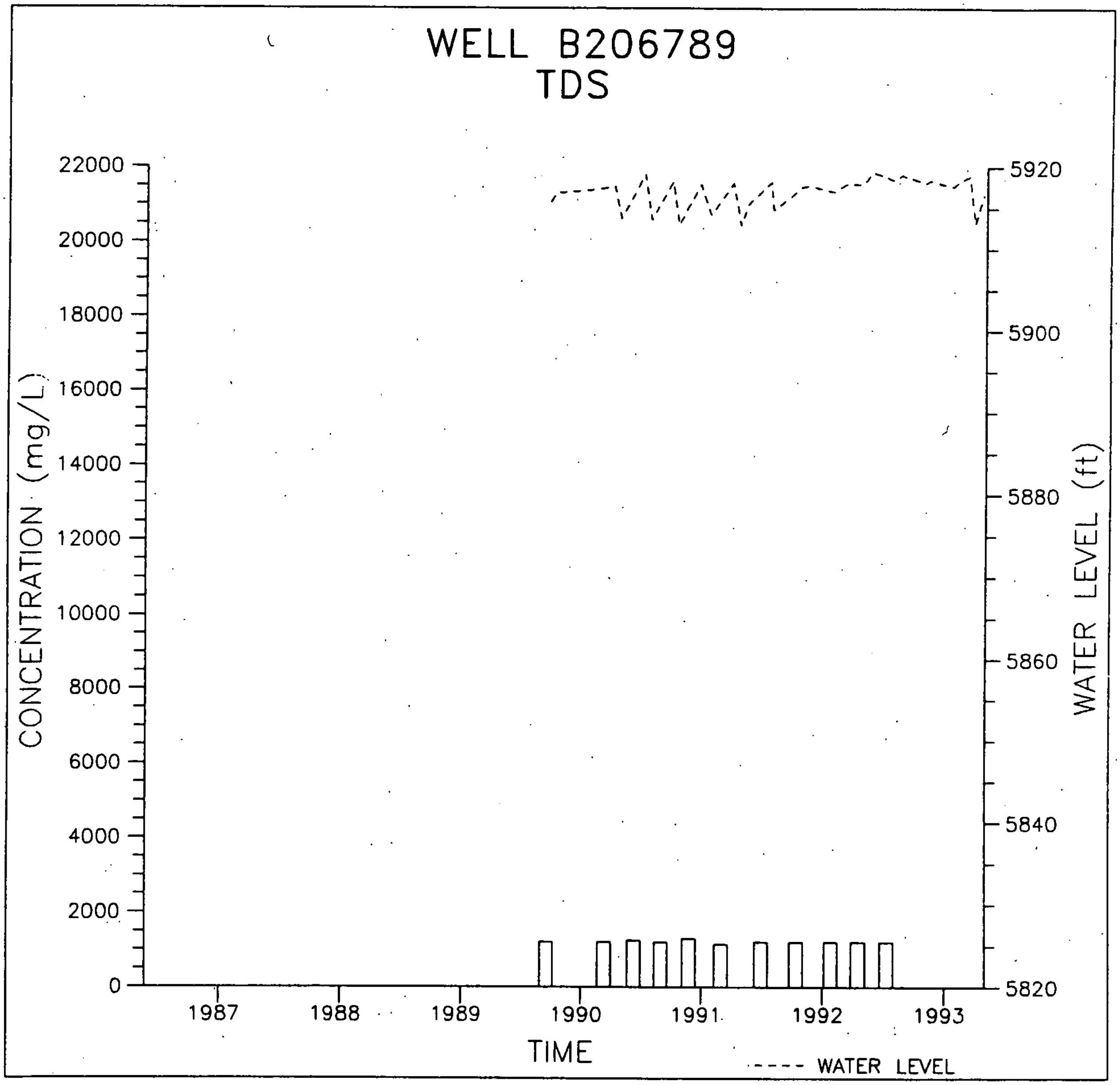

WELL 4387
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

472


WELL 5287
TDS
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
CONCENTRATION (mg/L)
5960
5940
5920
5900
5880
5860
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

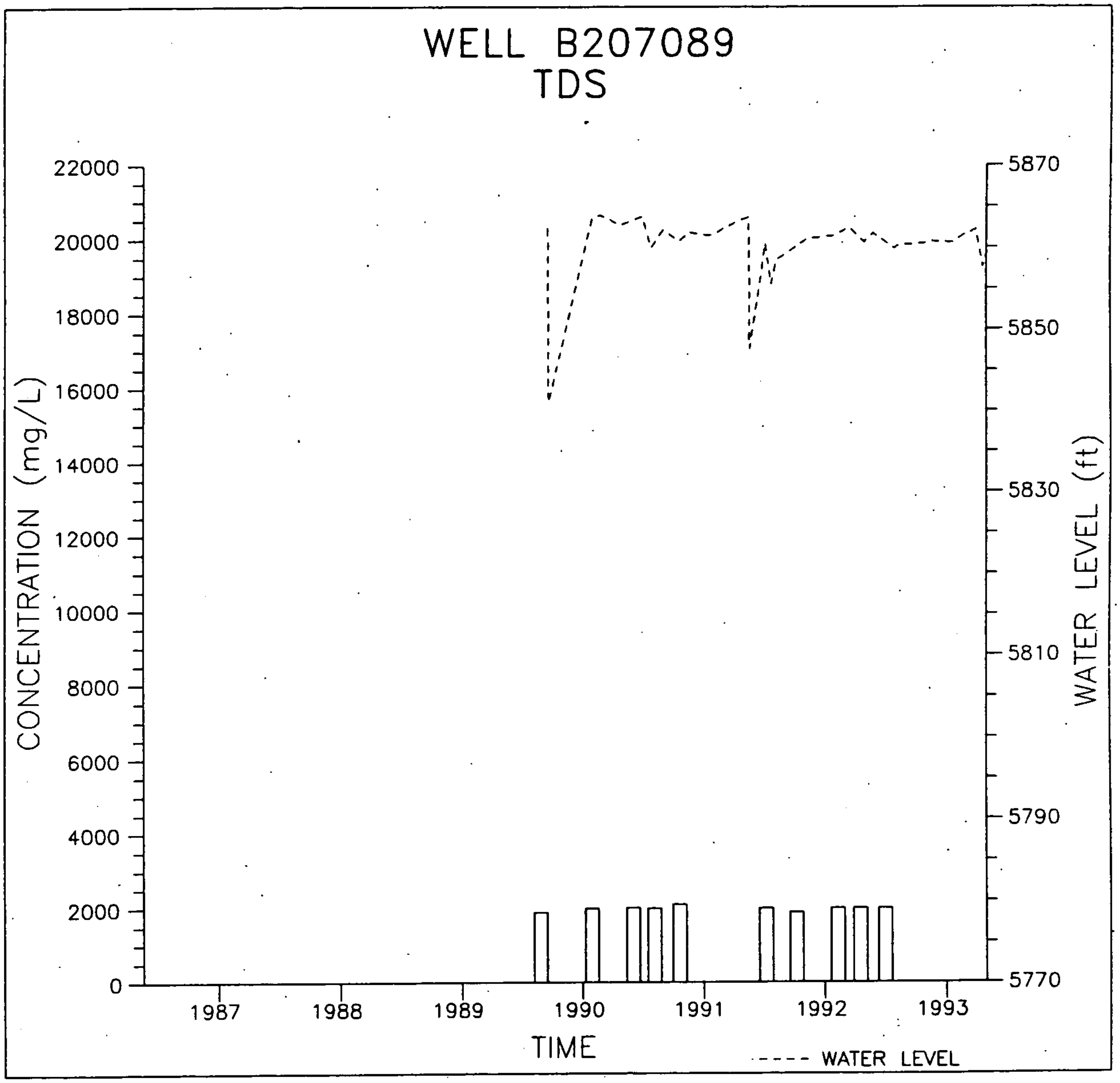
473

474

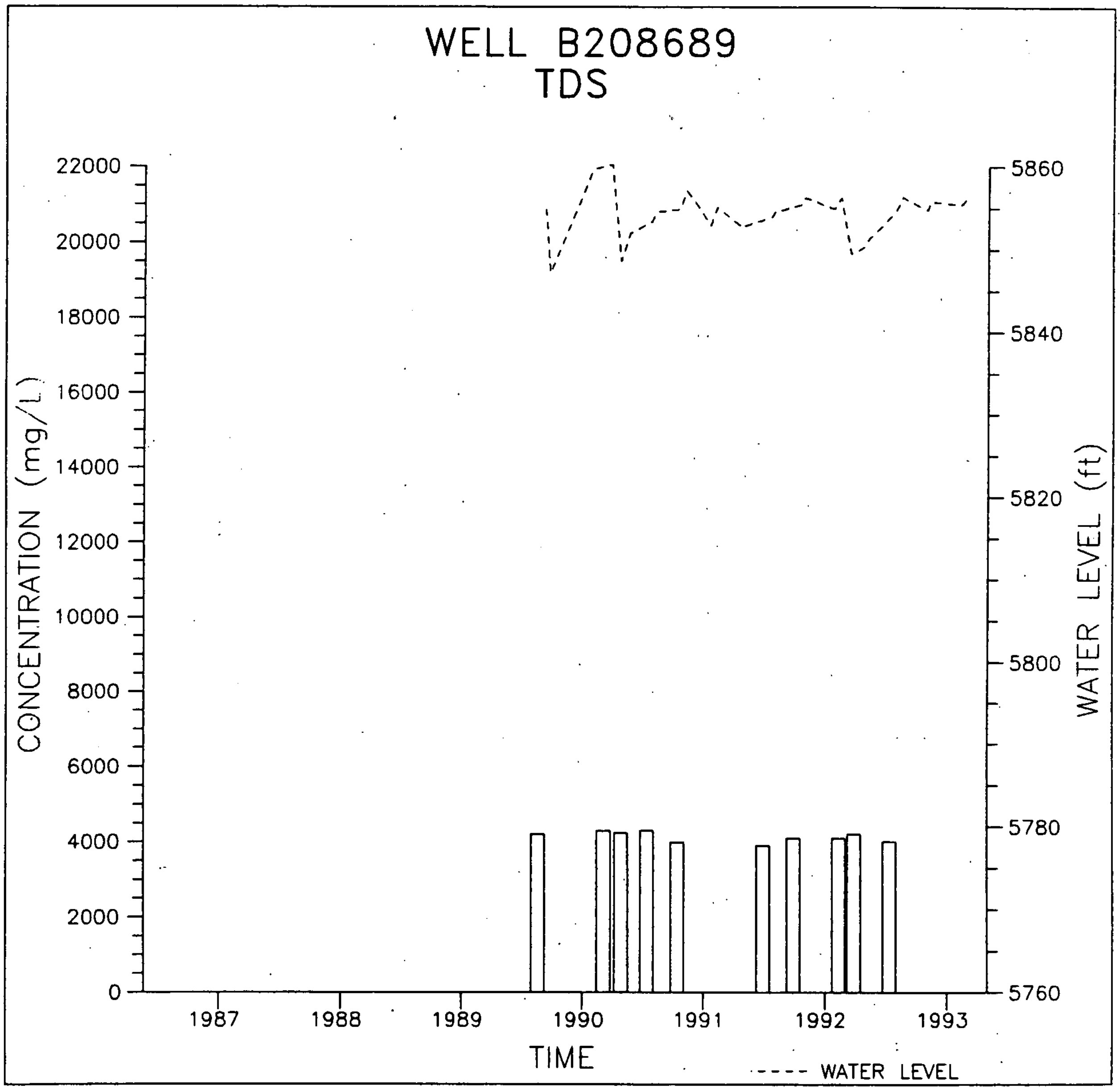

WELL B206789
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

474

~~475~~

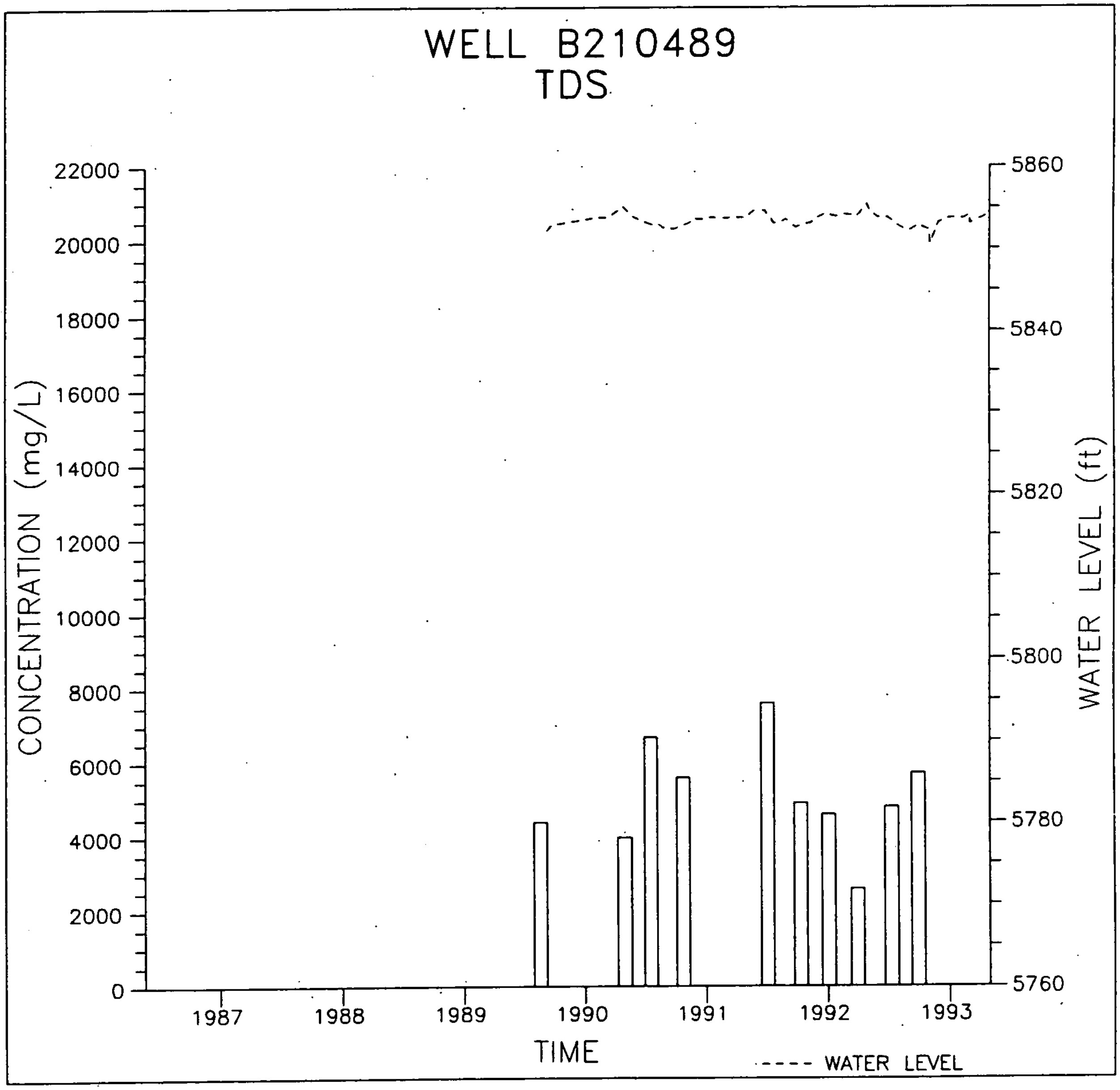

WELL B207089
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
---- WATER LEVEL

475


WELL B208689
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

476

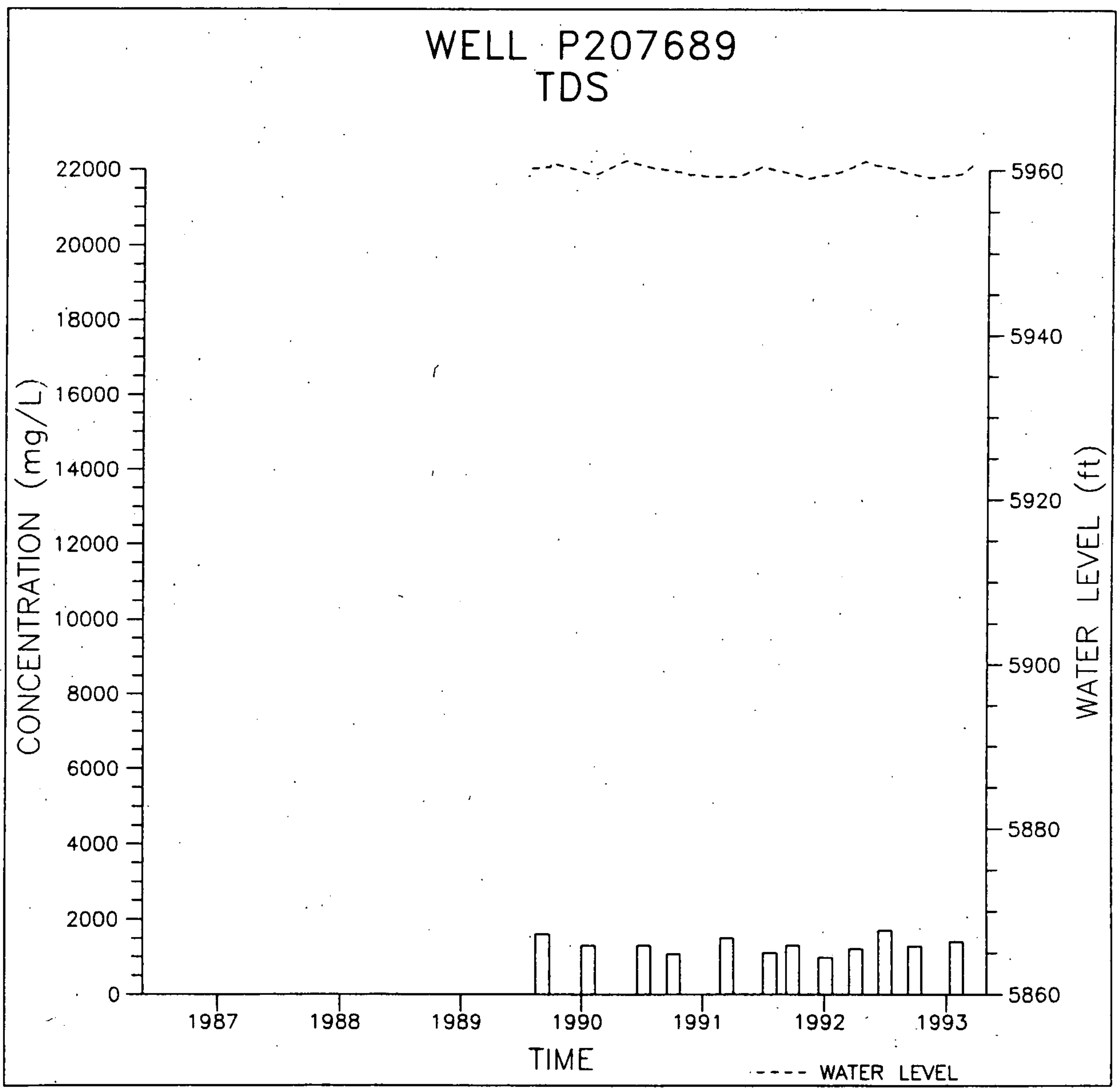
477



WELL B210489
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

477

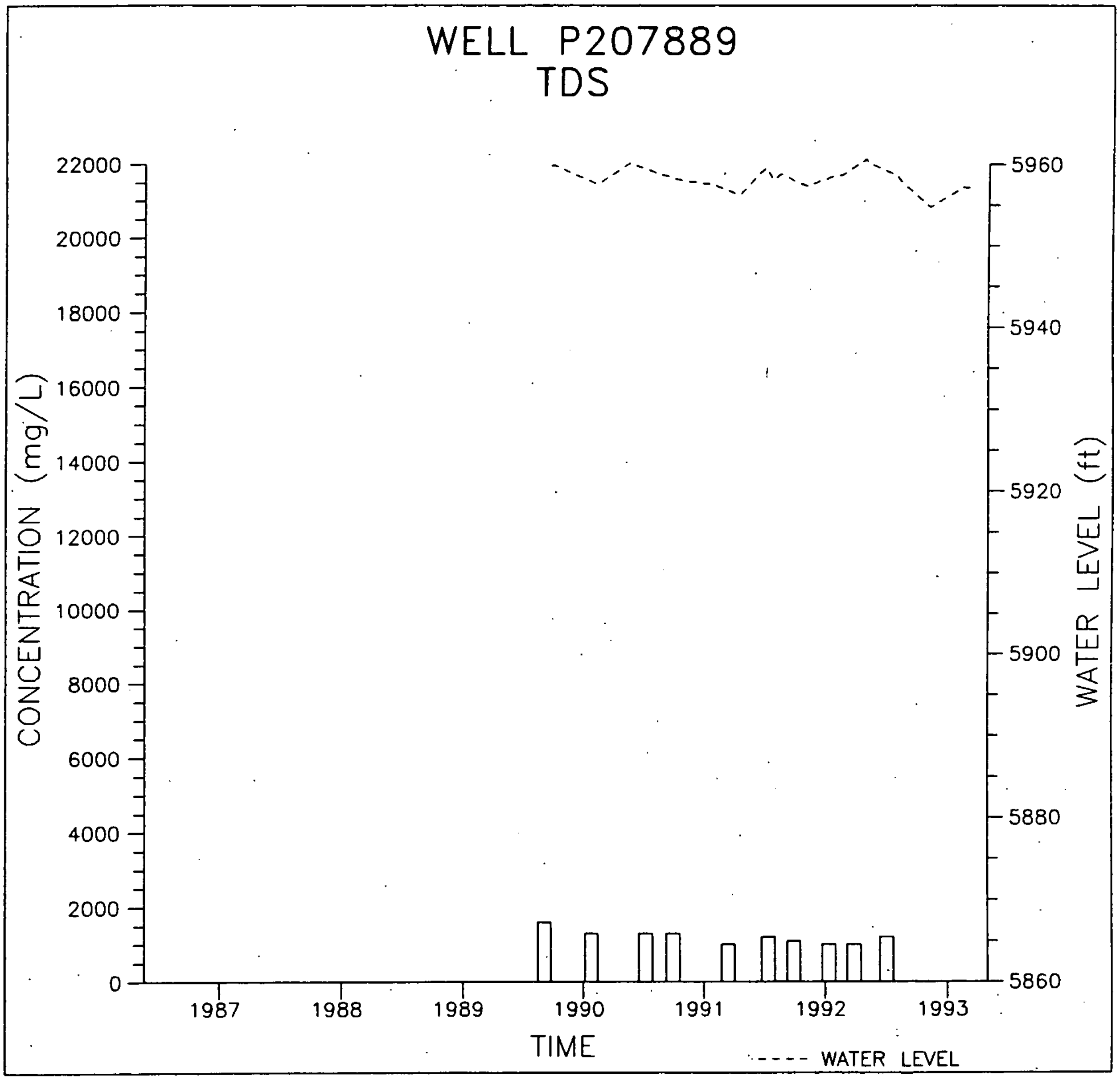
478



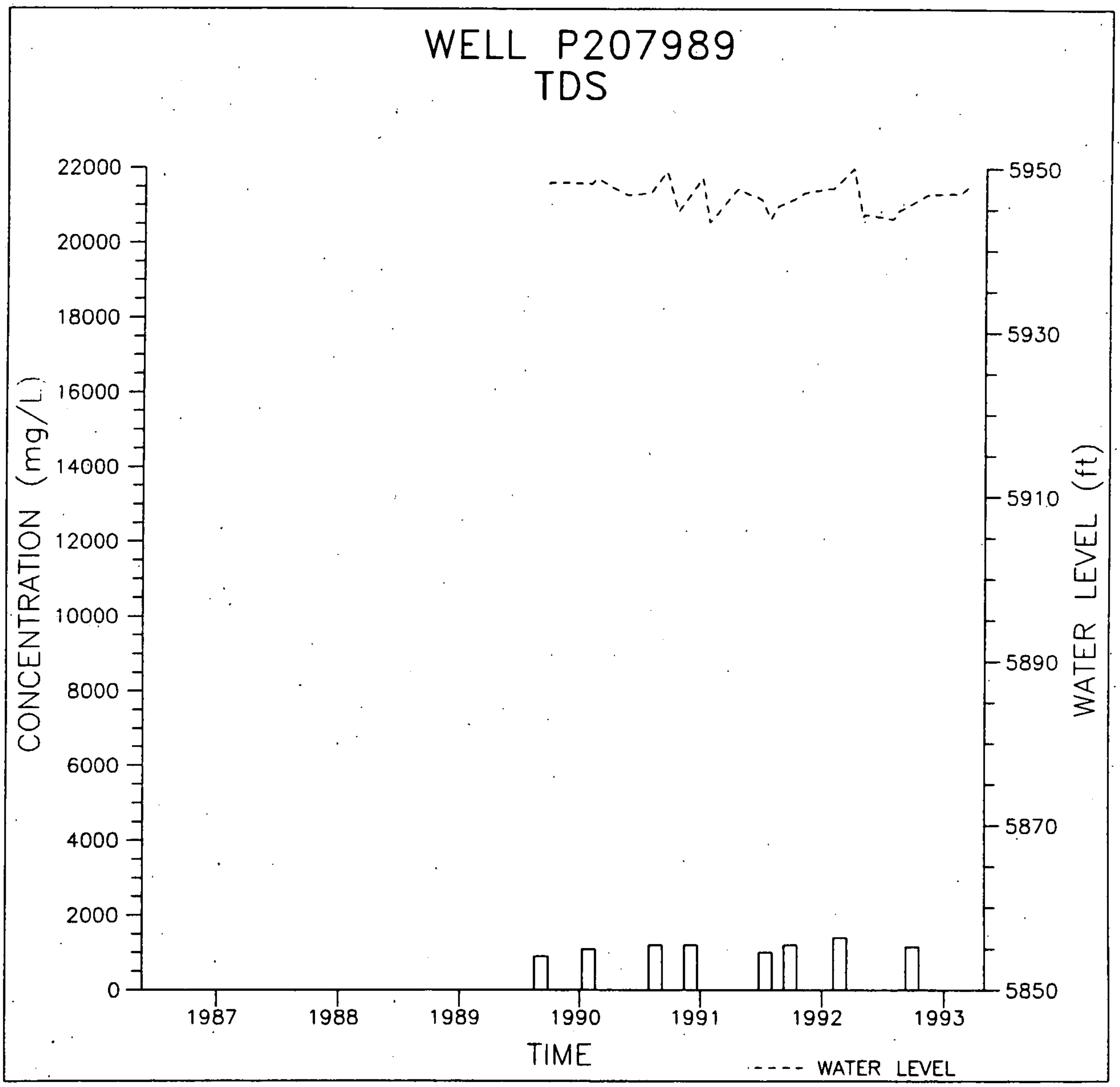
WELL P207689
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
5960
5940
5920
5900
5880
5860
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

478

479

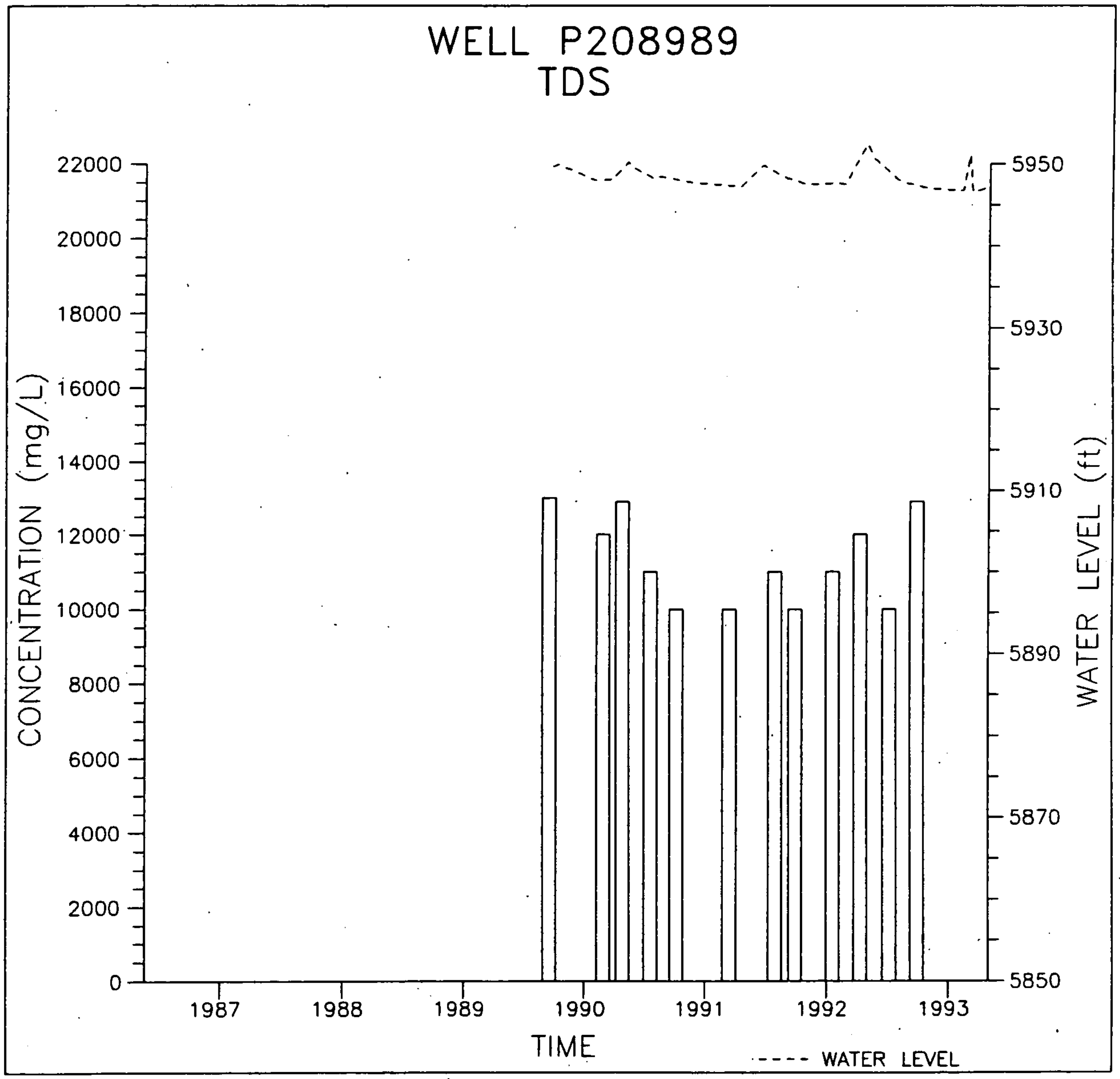


WELL P207889
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



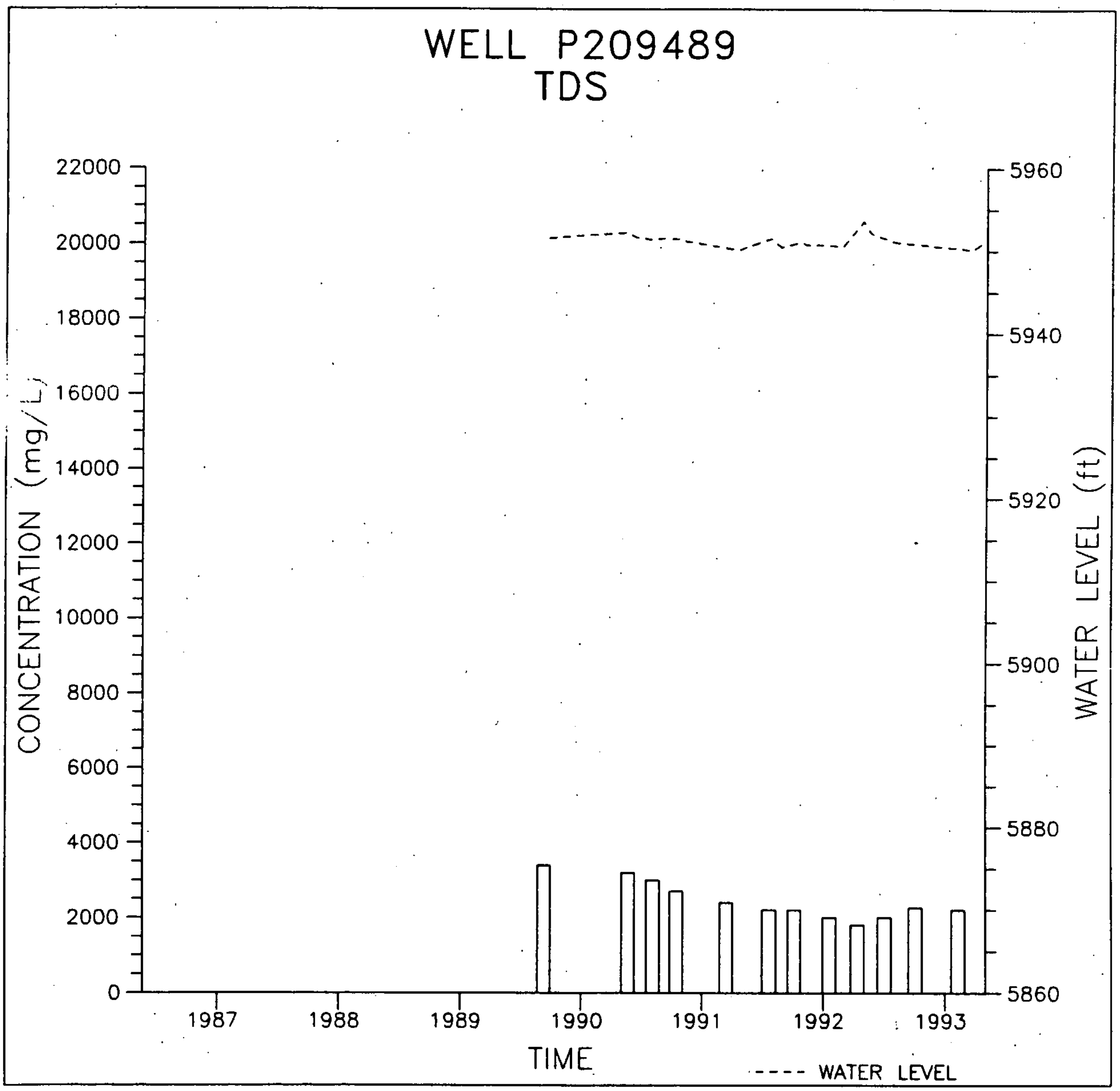
WELL P207989
TDS
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
CONCENTRATION (mg/L)
5950
5930
5910
5890
5870
5850
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

480


WELL P208989
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

482

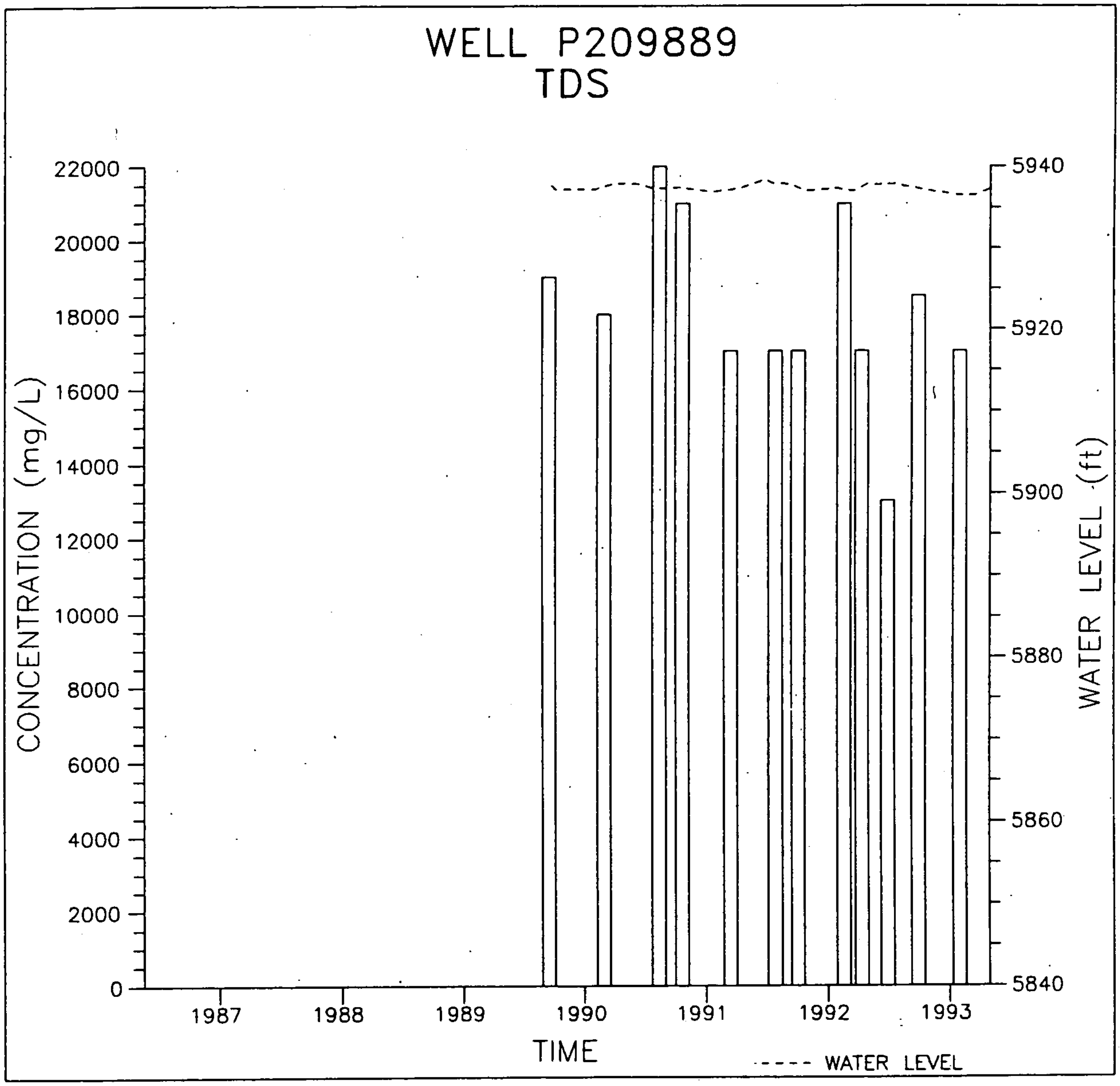
481



WELL P209489
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

482

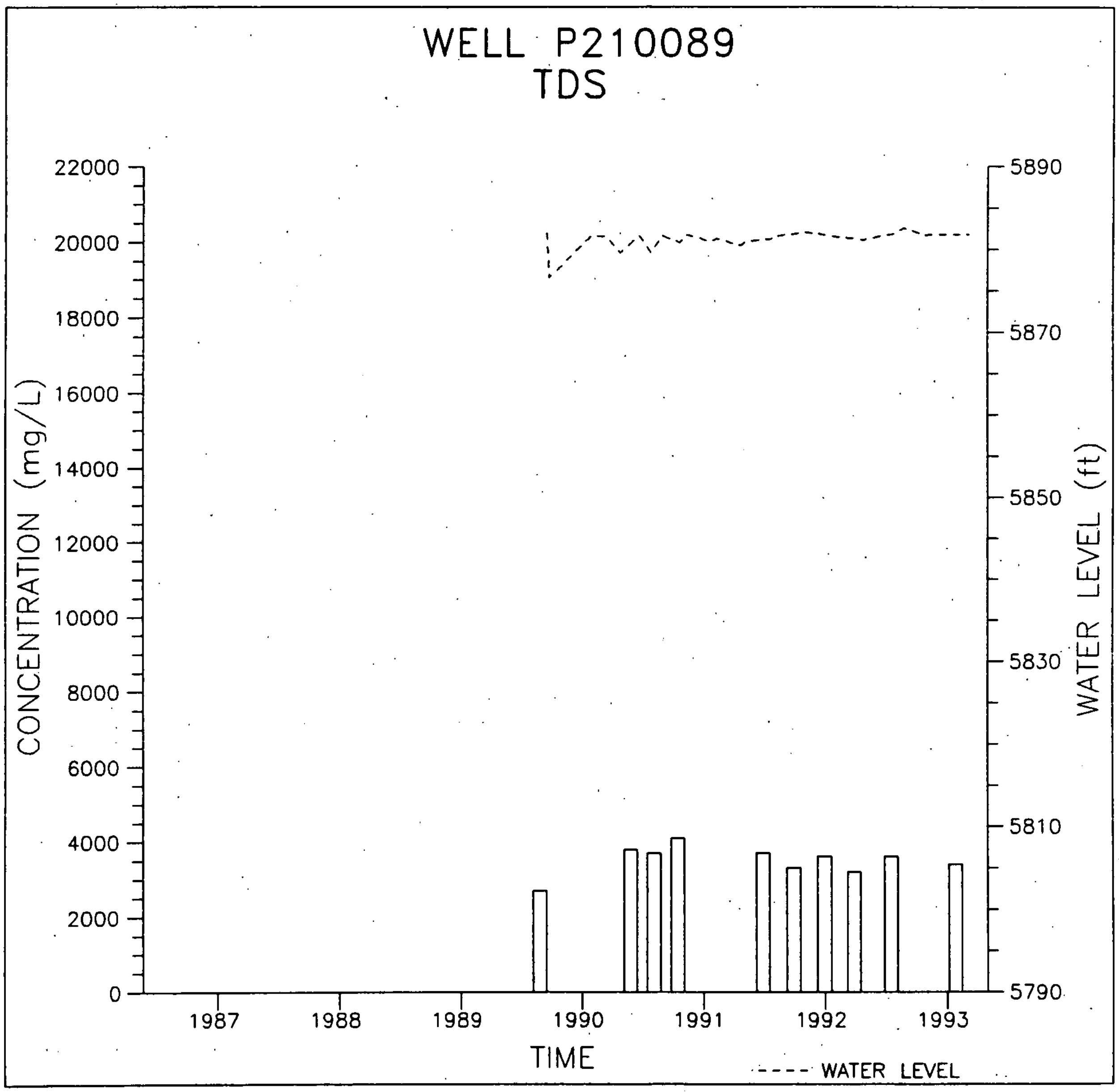
#583



WELL P209889
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

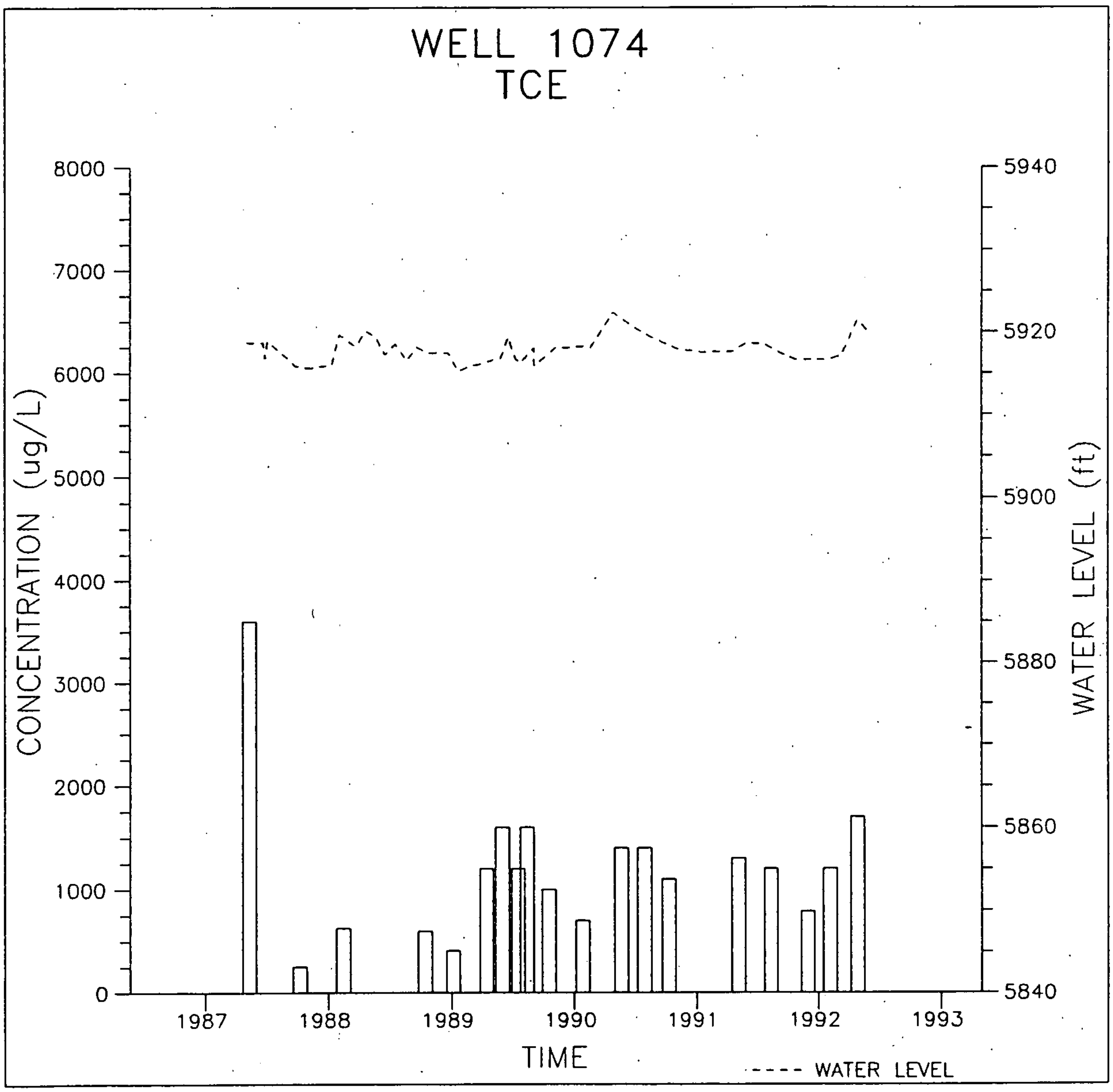
483

484


WELL P210089
TDS
CONCENTRATION (mg/L)
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

484

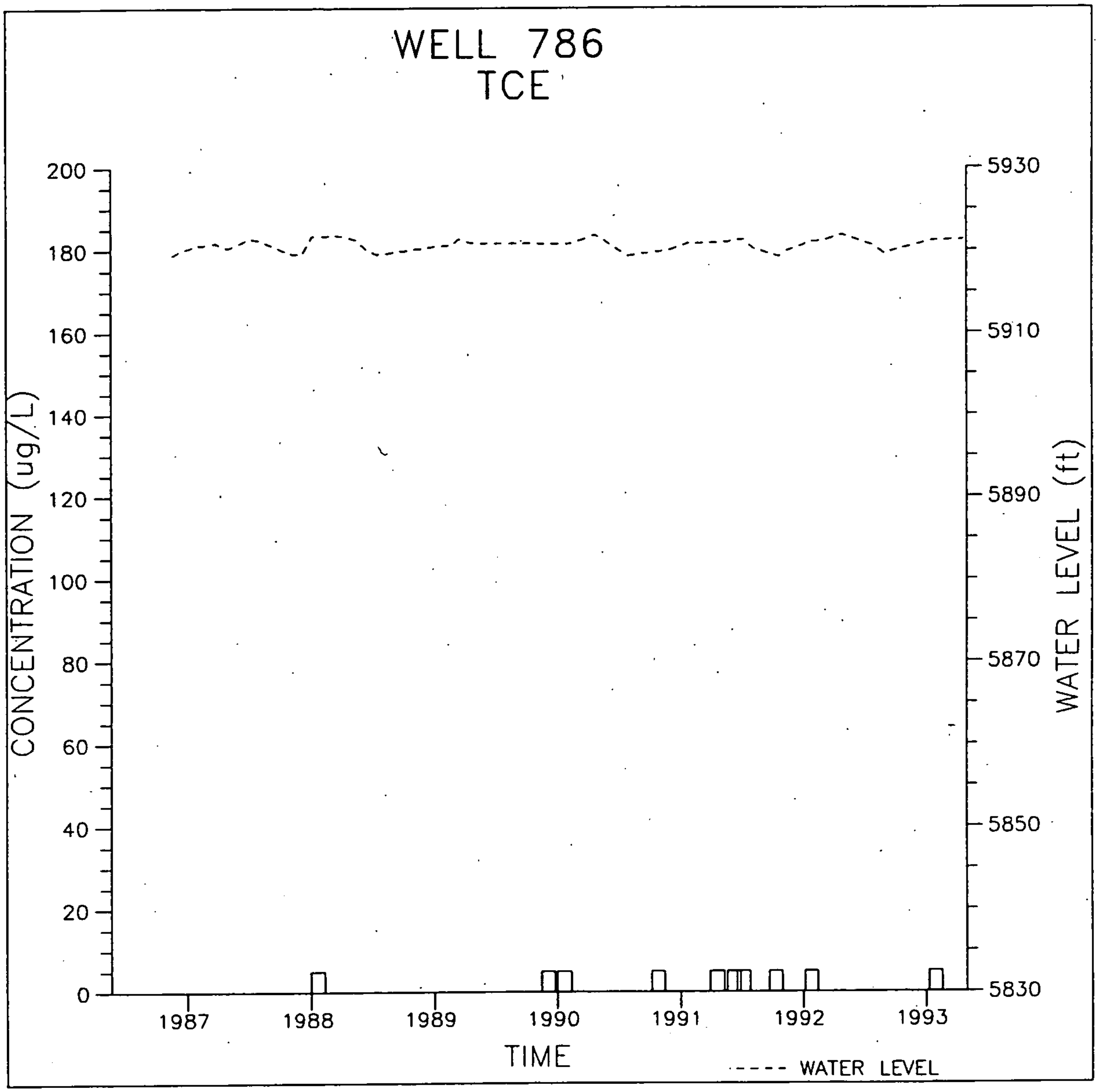
485



WELL 1074
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
8000
7000
6000
5000
4000
3000
2000
1000
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

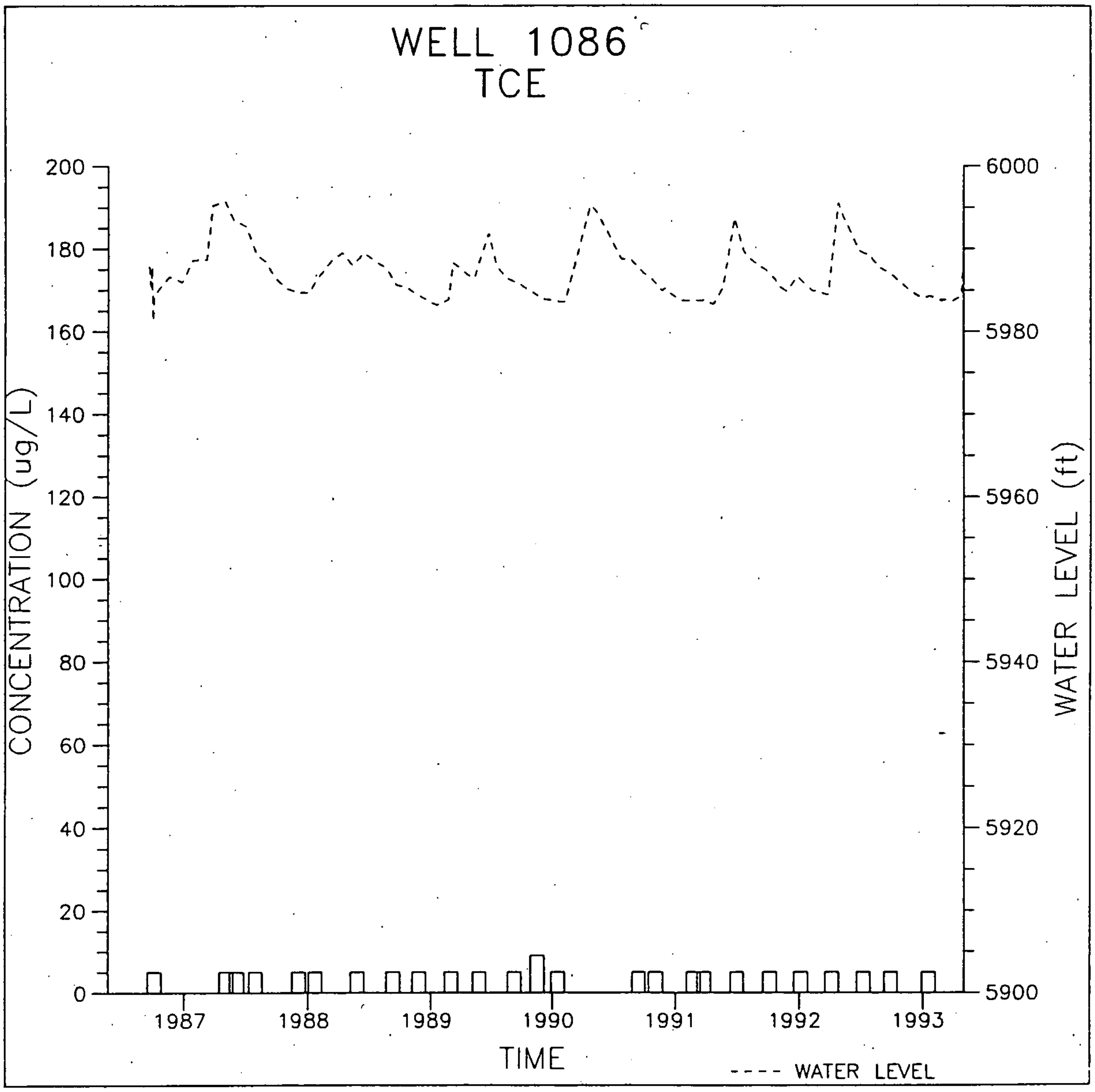
485

486


WELL 786
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

486

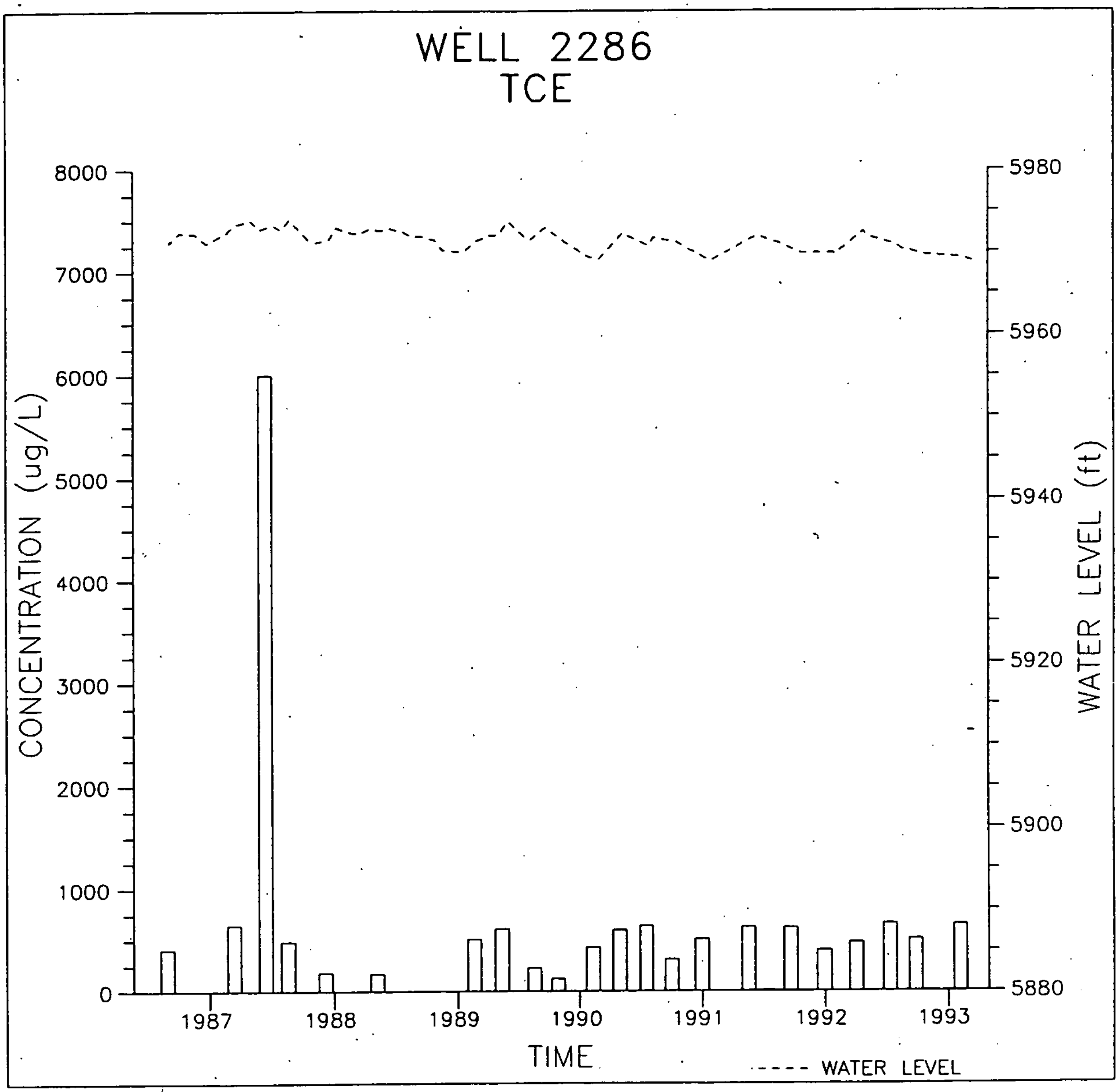
#87



WELL 1086
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6000
5980
5960
5940
5920
5900
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

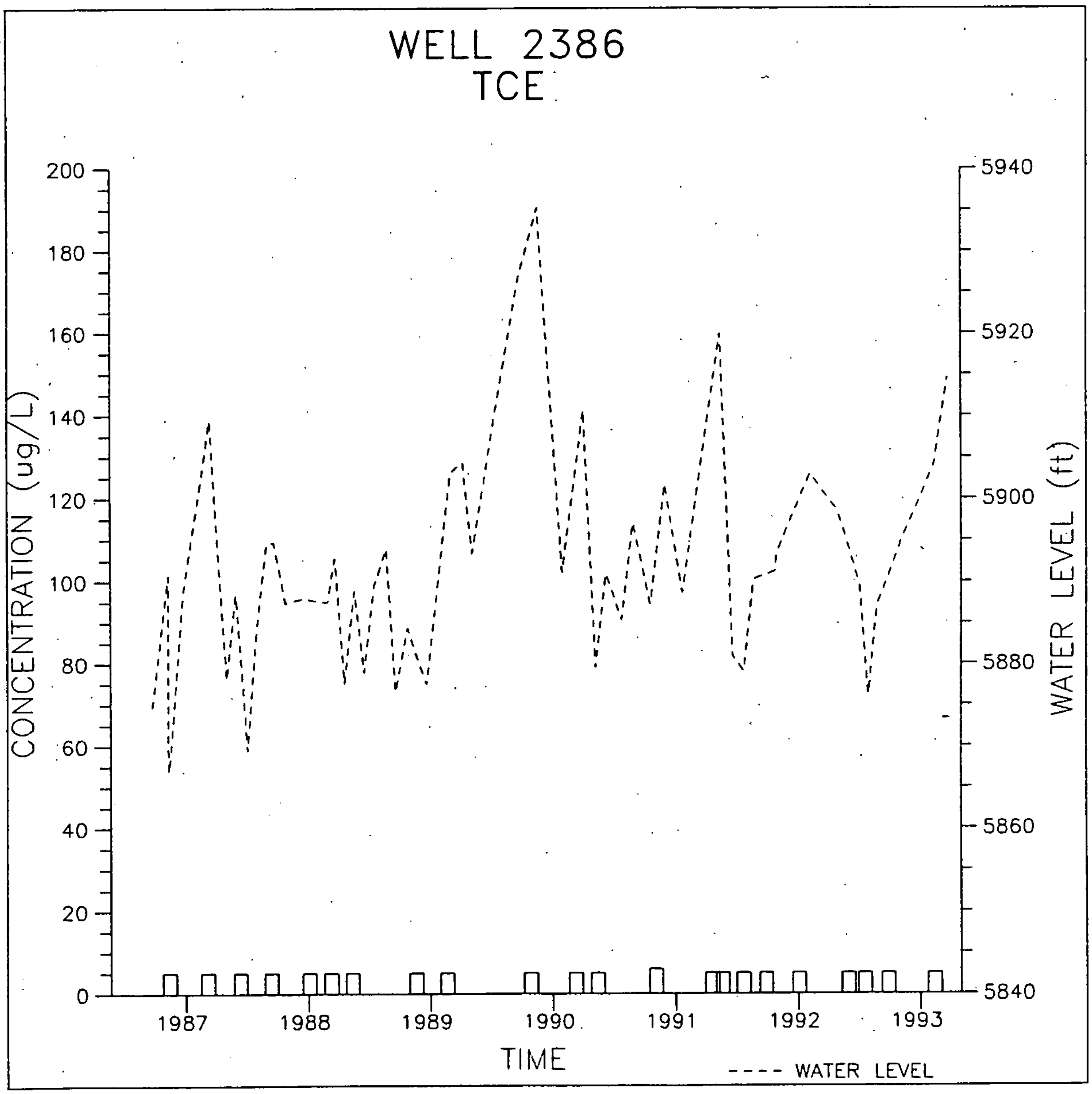
487

488



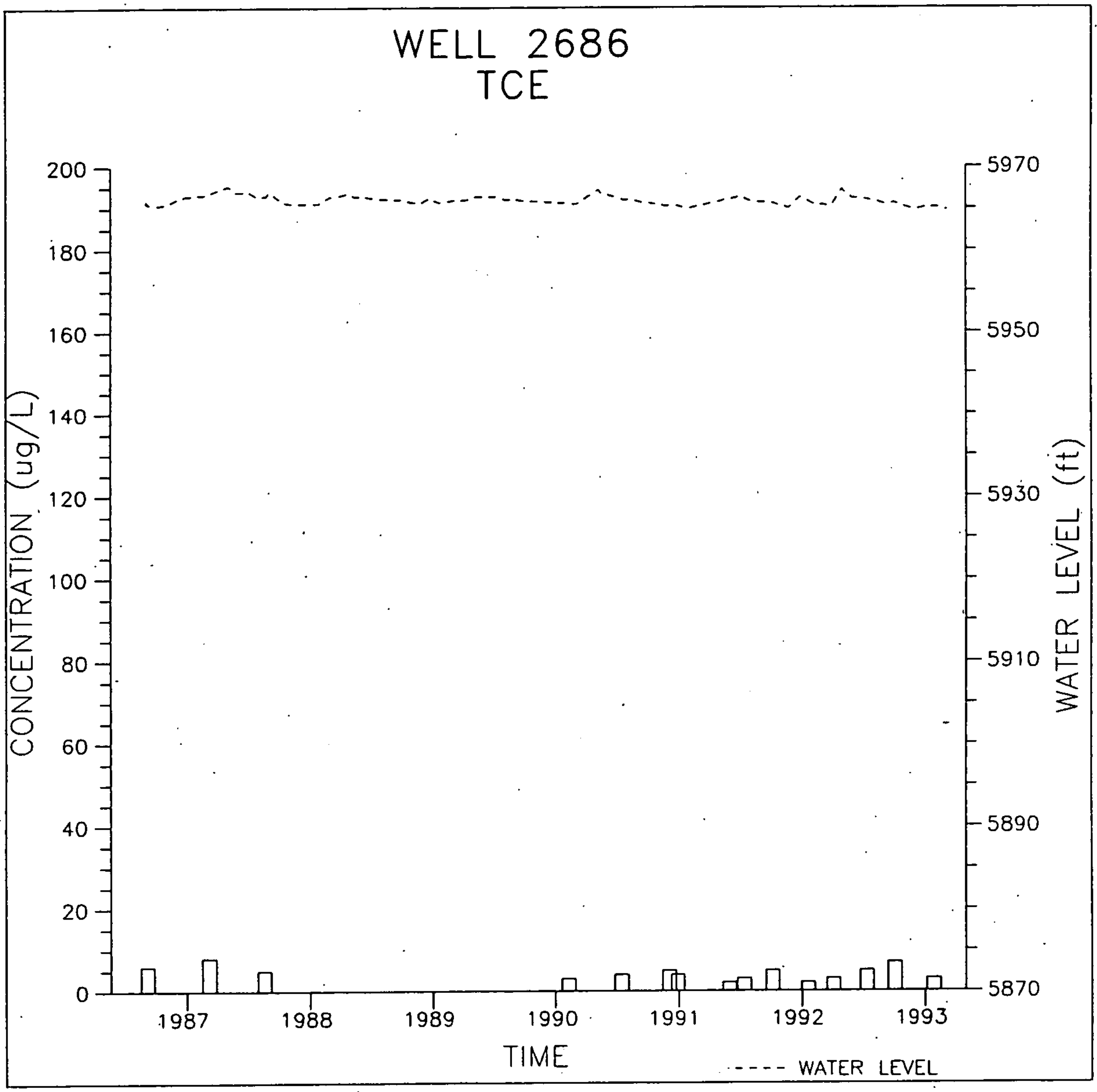
WELL 2286
TCE
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

488



WELL 2386
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

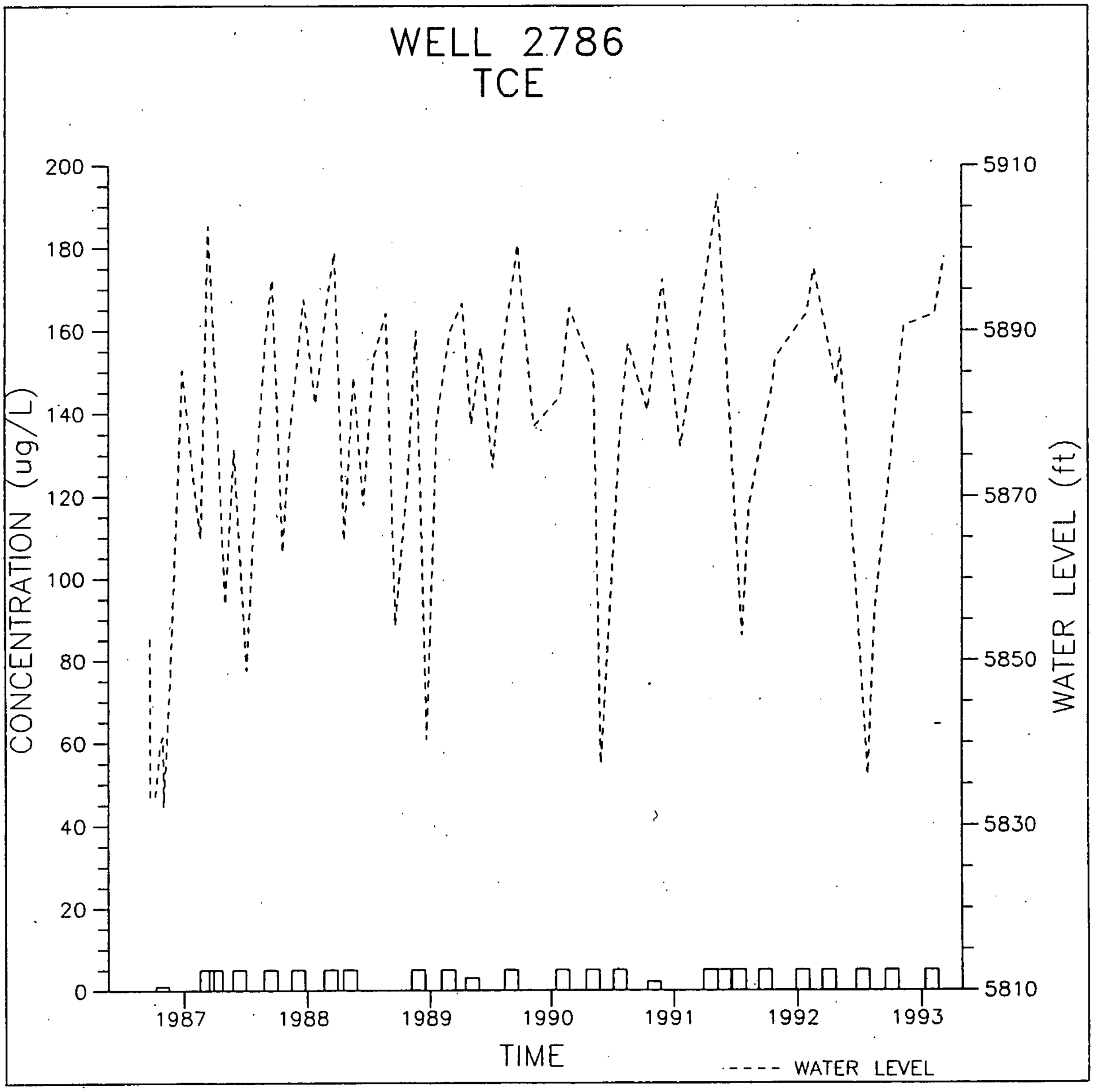
489



WELL 2686
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

490

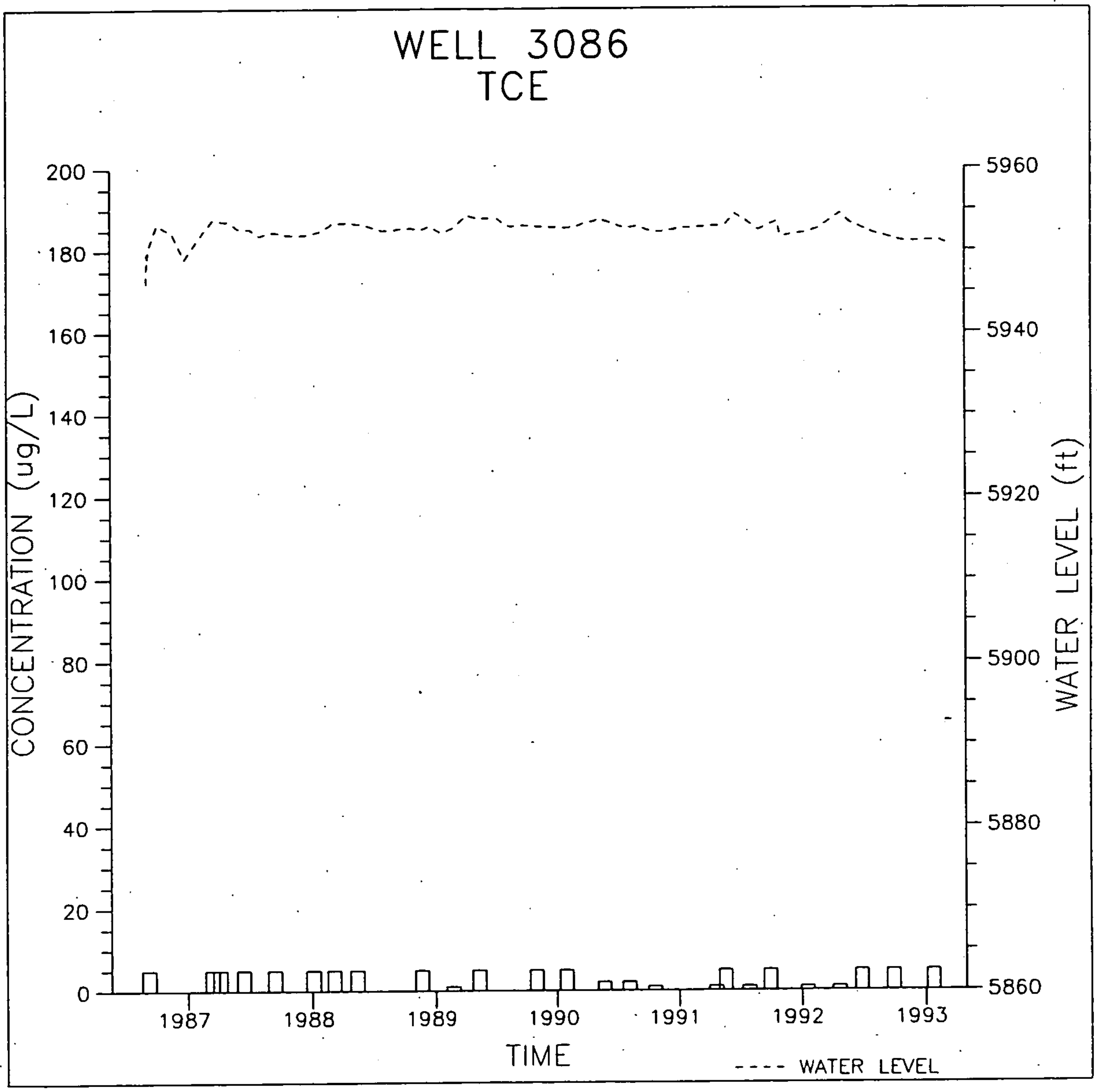
491



WELL 2786
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993

491

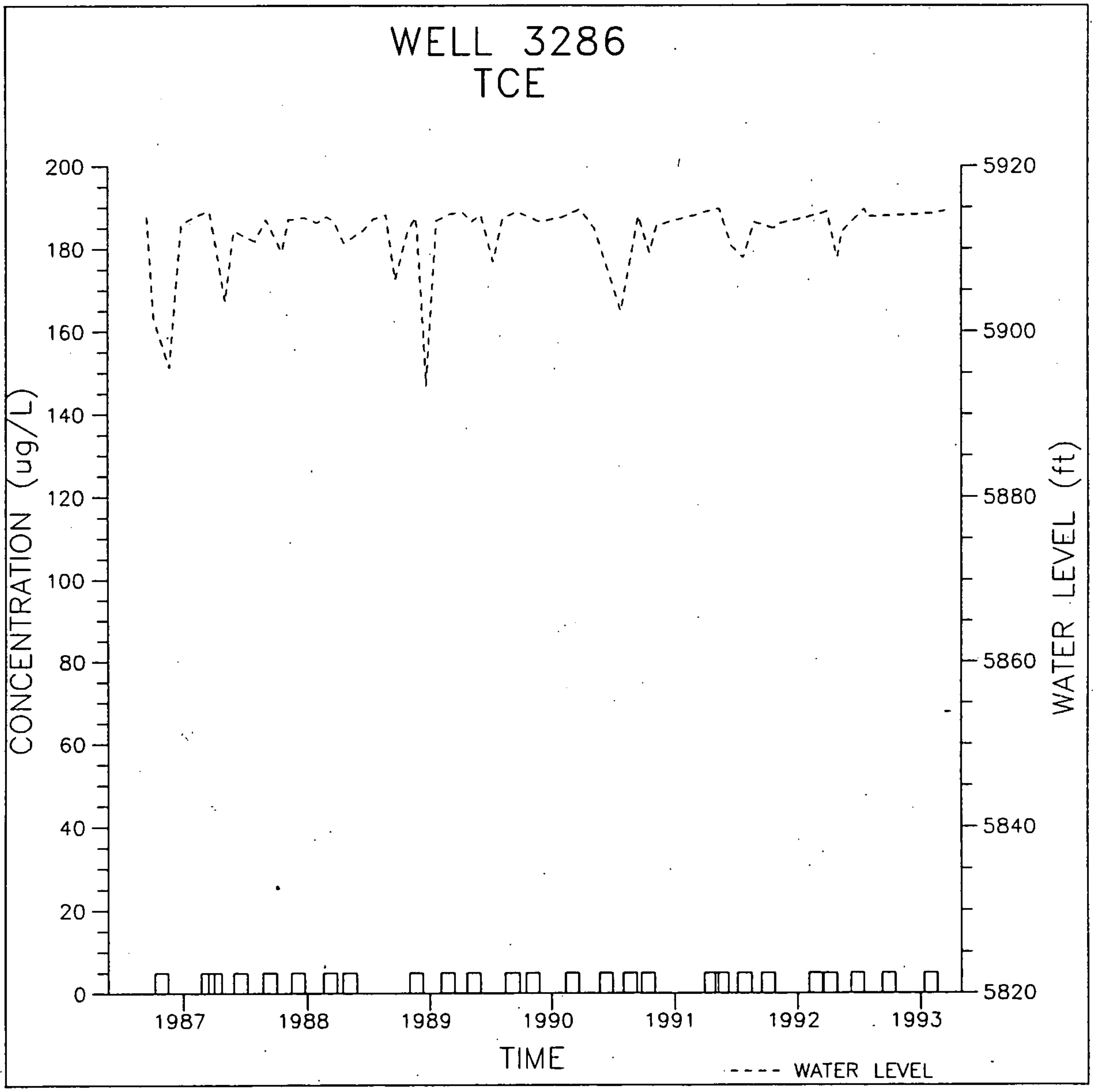
492



WELL 3086
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

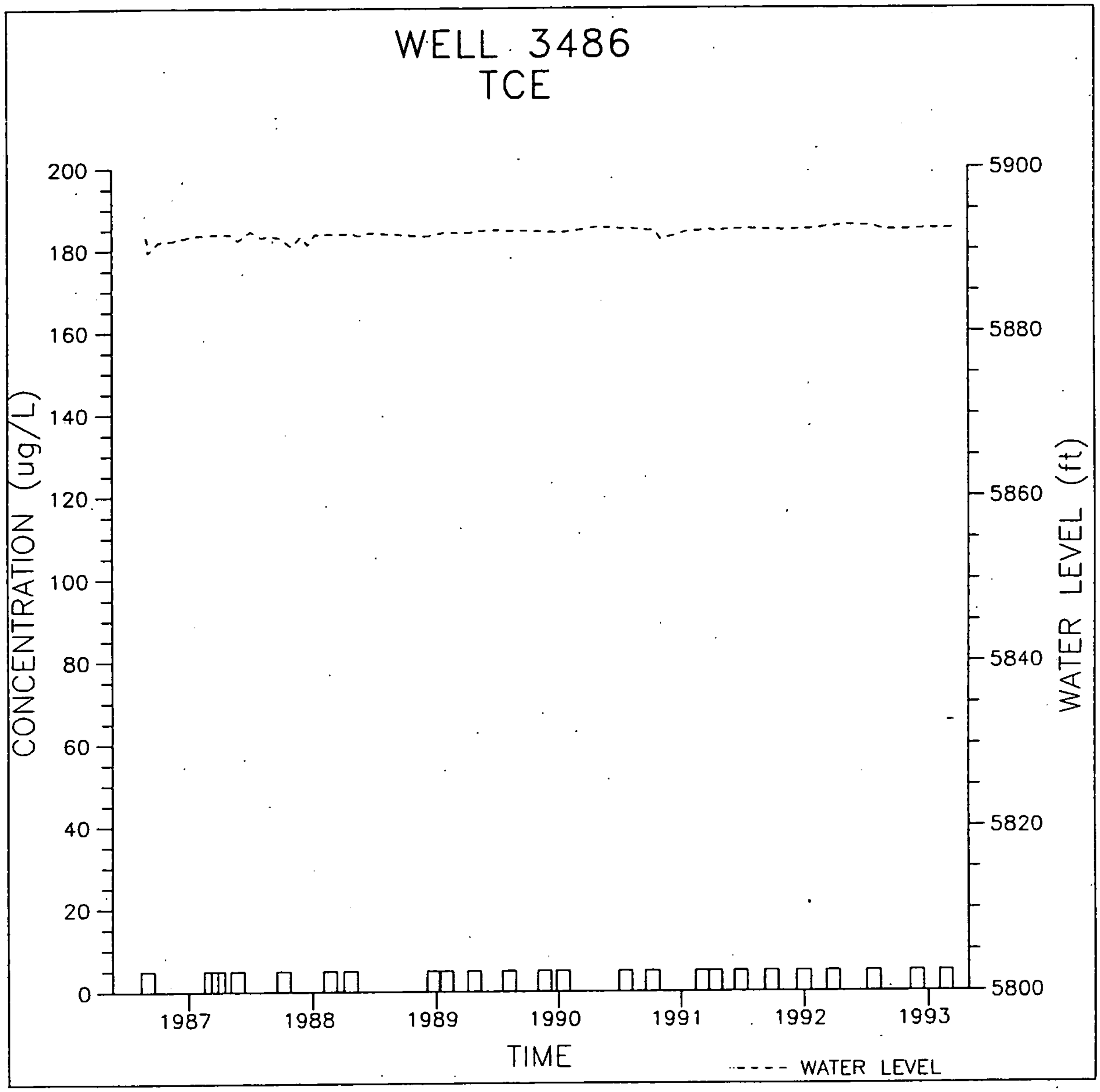
492

4497


WELL 3286
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

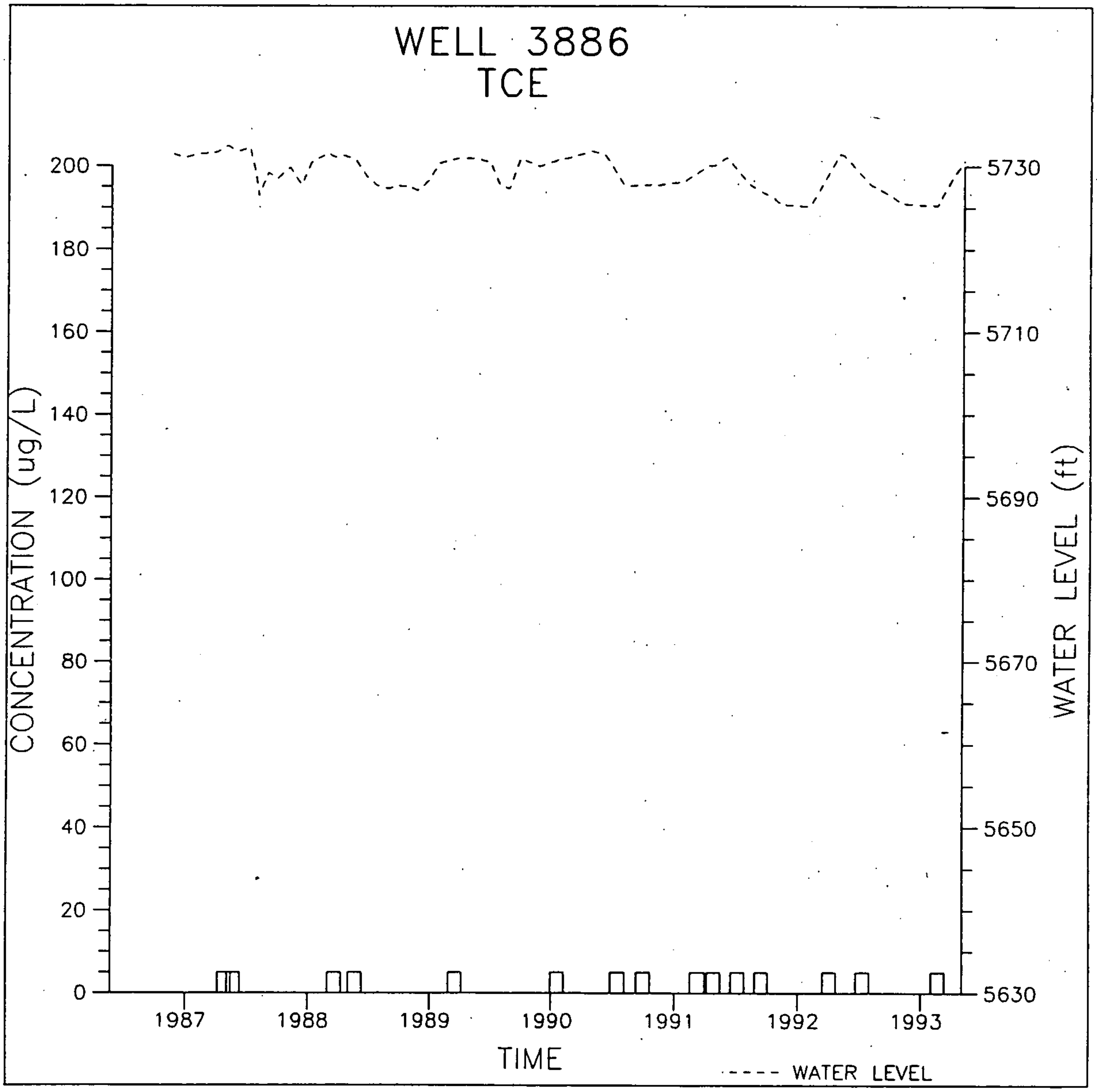
493

494


WELL 3486
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

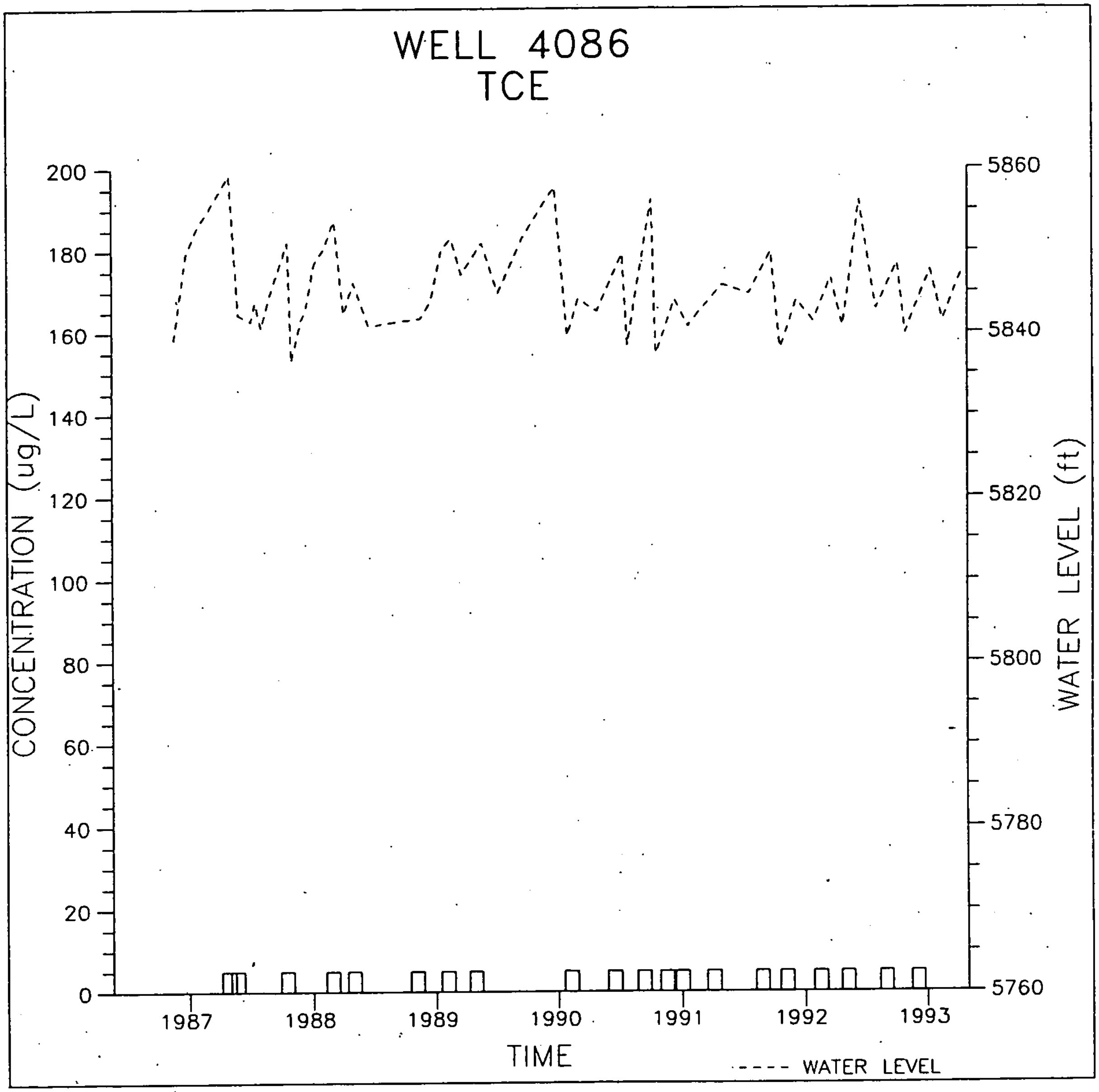
494

455


WELL 3886
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5730
5710
5690
5670
5650
5630
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

495

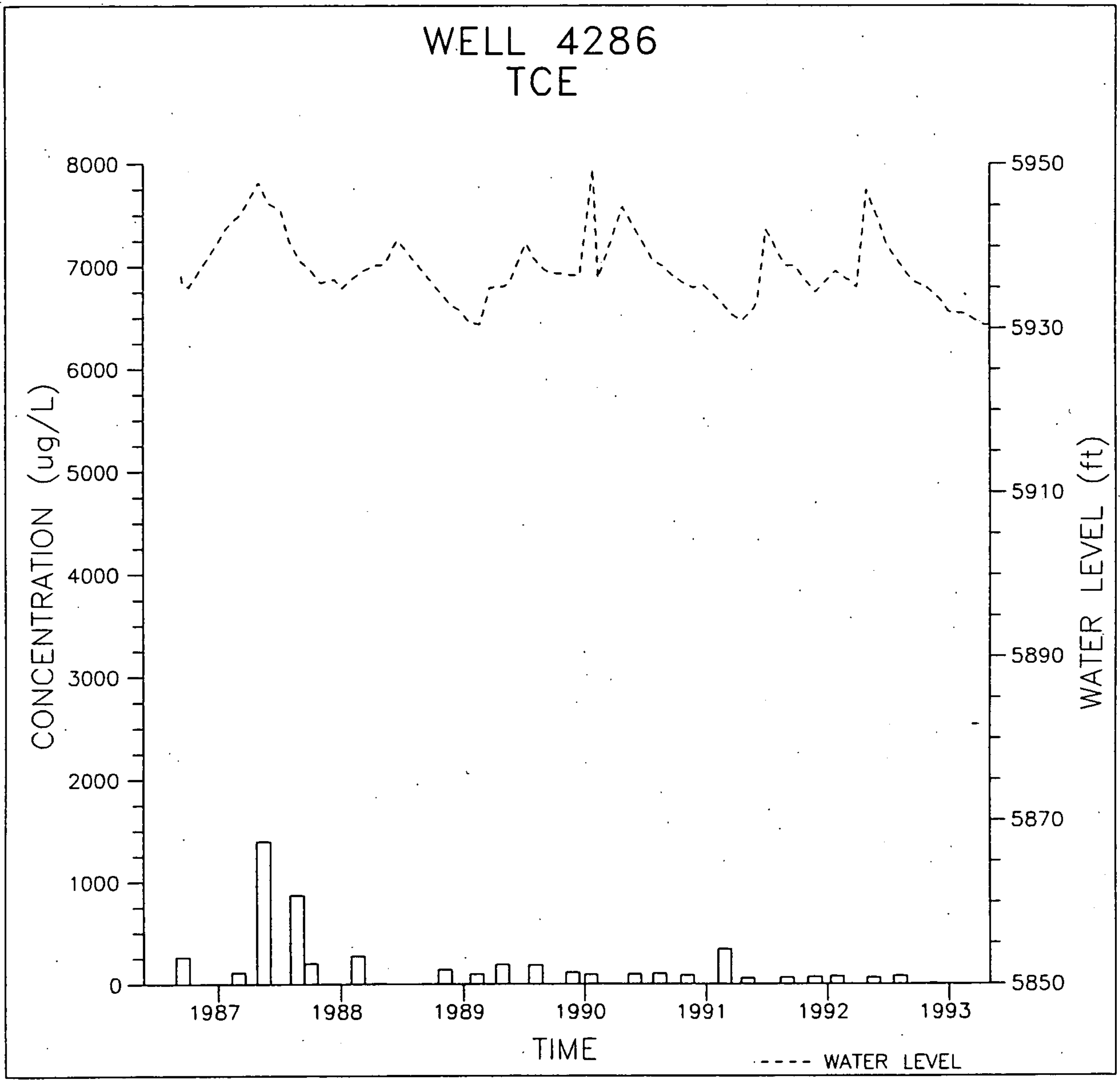
496



WELL 4086
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

496

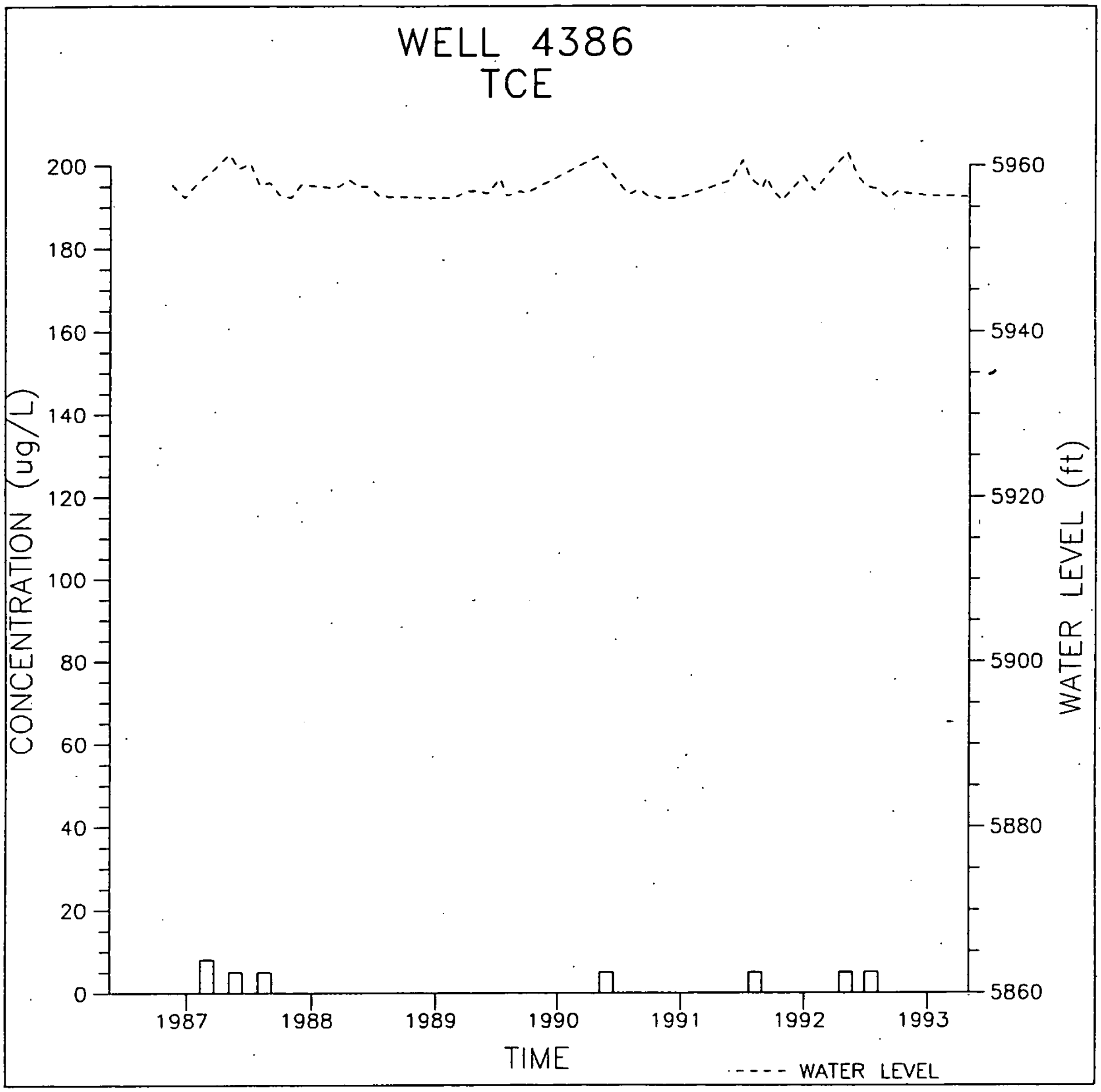
497

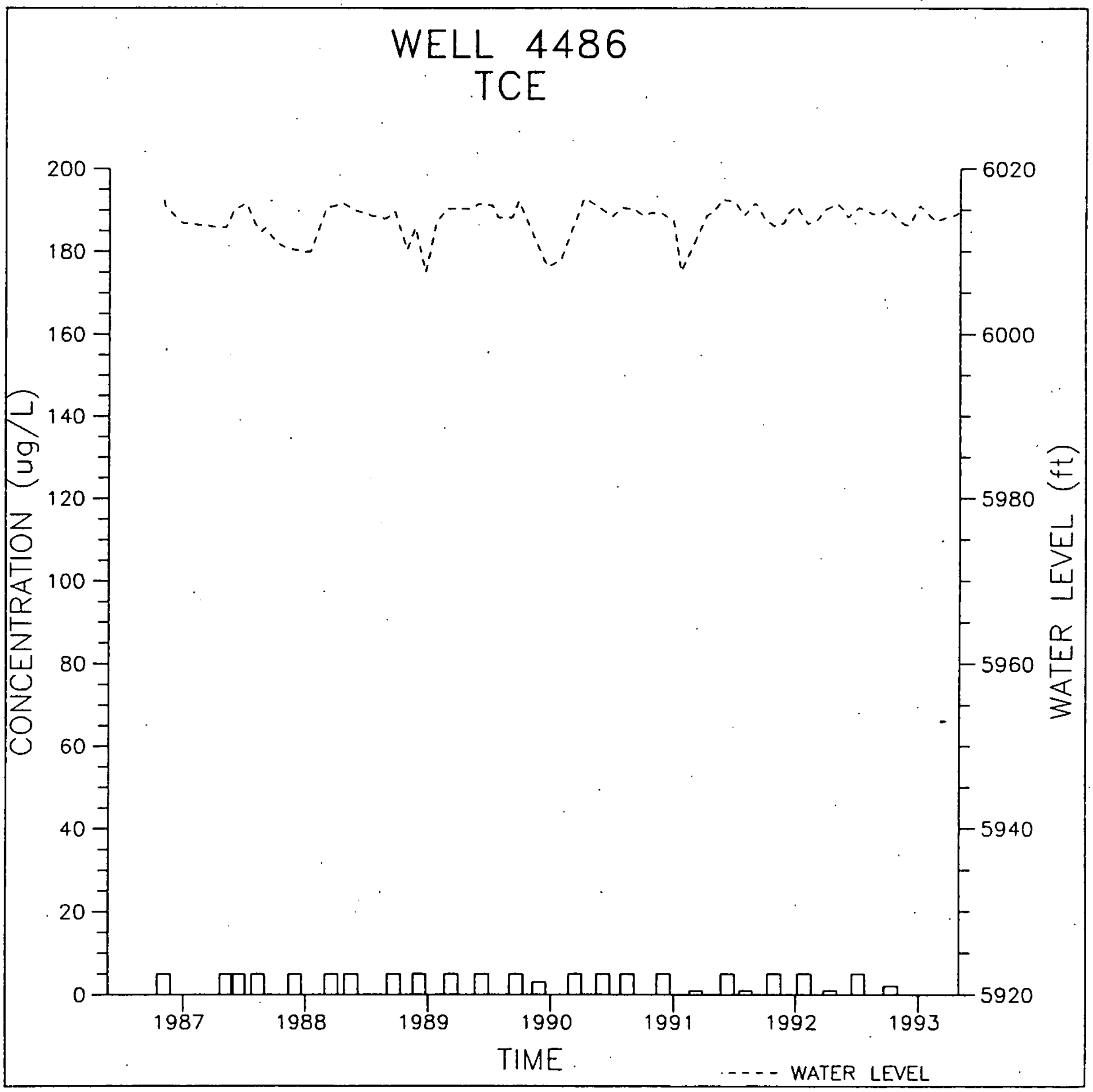


WELL 4286
TCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
5950
5930
5910
5890
5870
5850
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

497

498

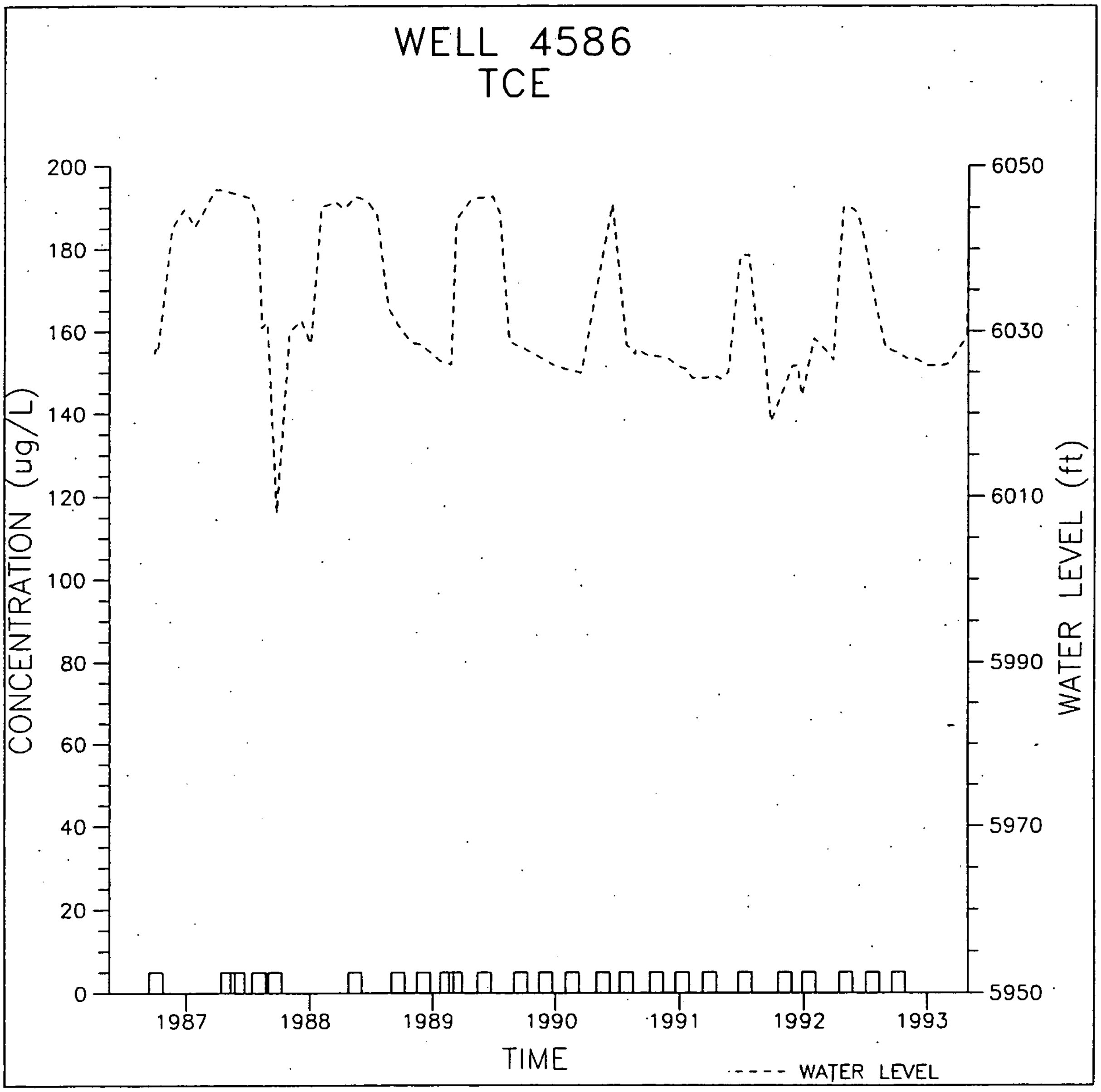

WELL 4386
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL 4486
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

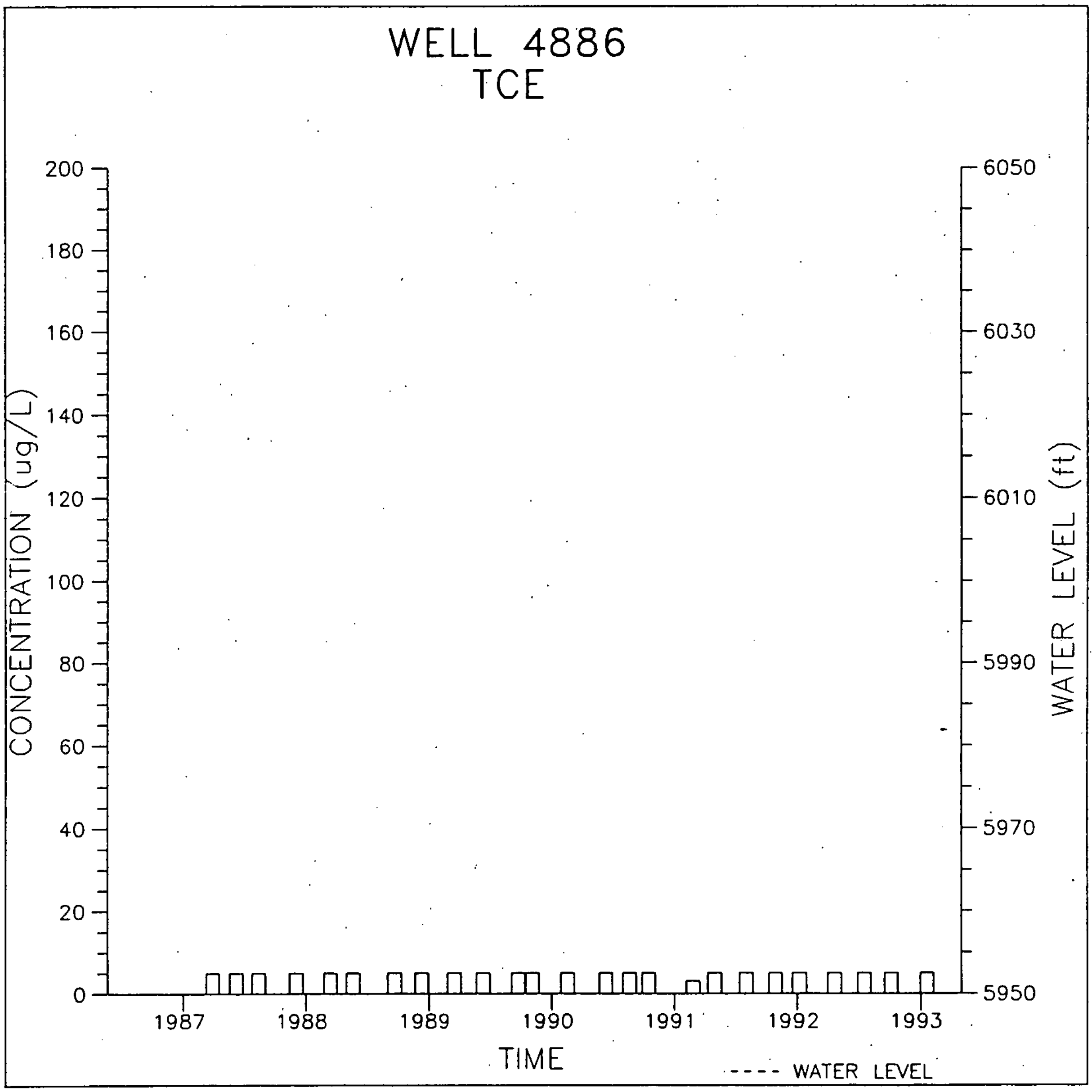
499

500



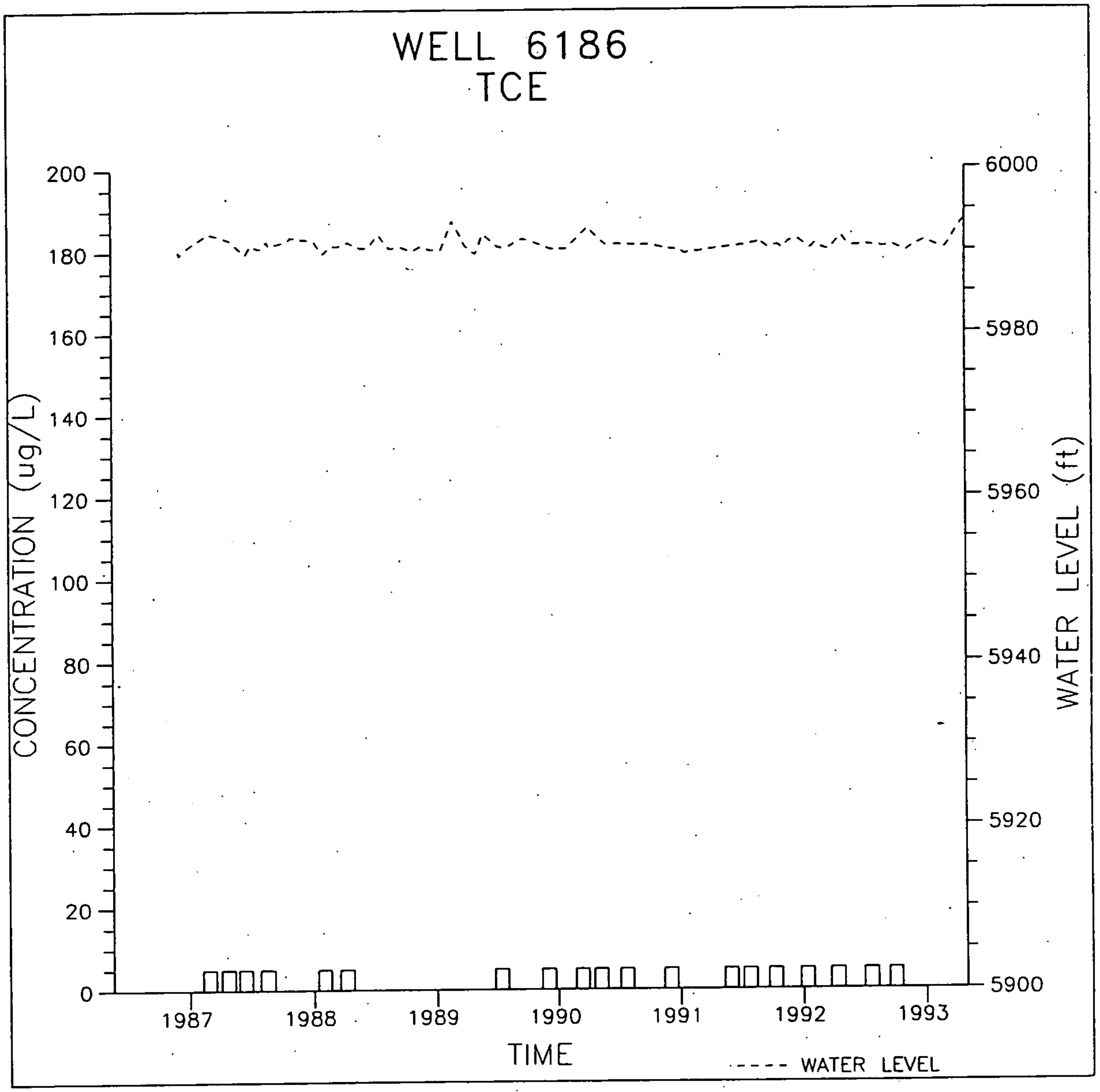
WELL 4586
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

500



WELL 4886
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

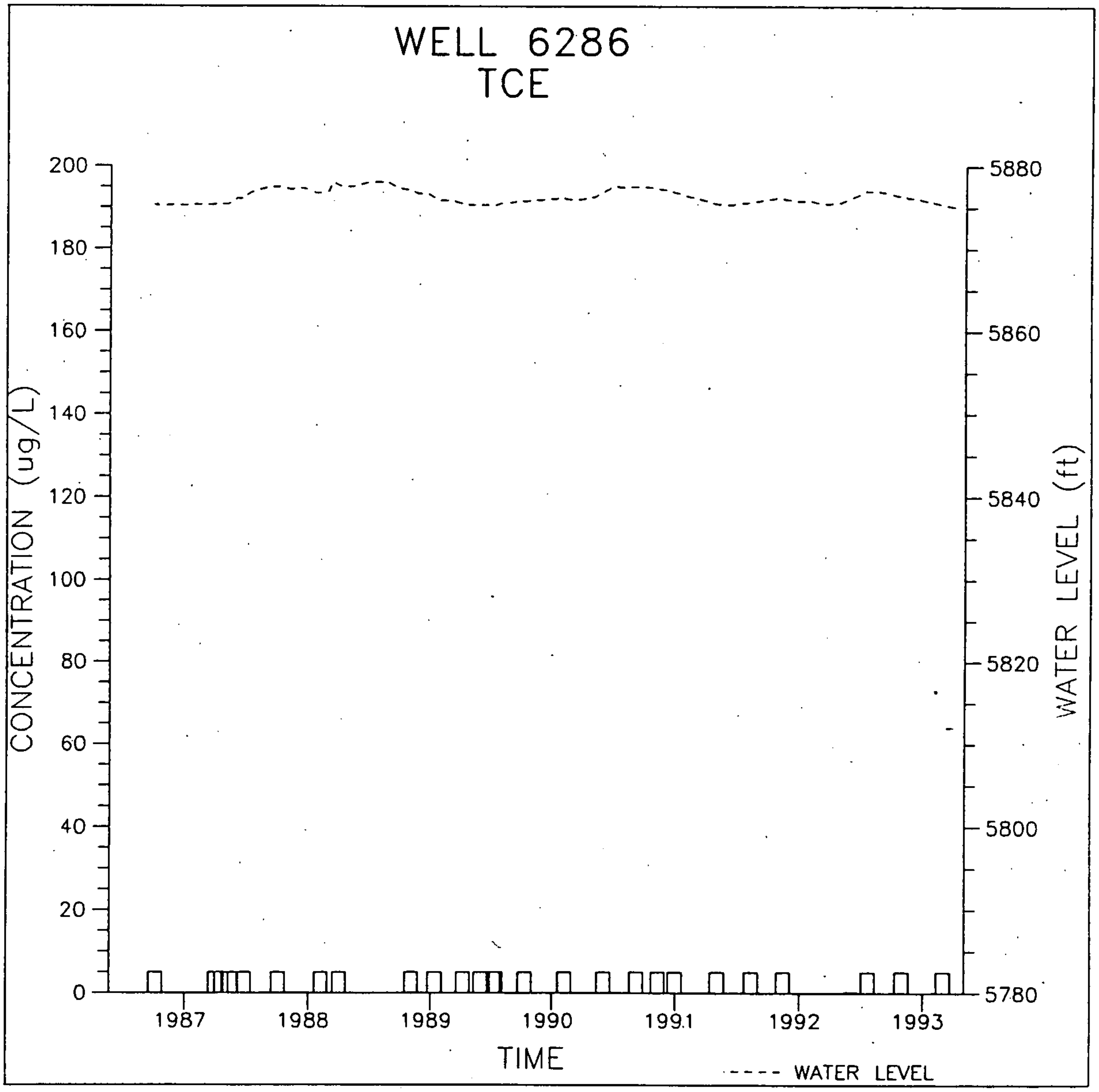
501



WELL 6186
TCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5900
5920
5940
5960
5980
6000
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

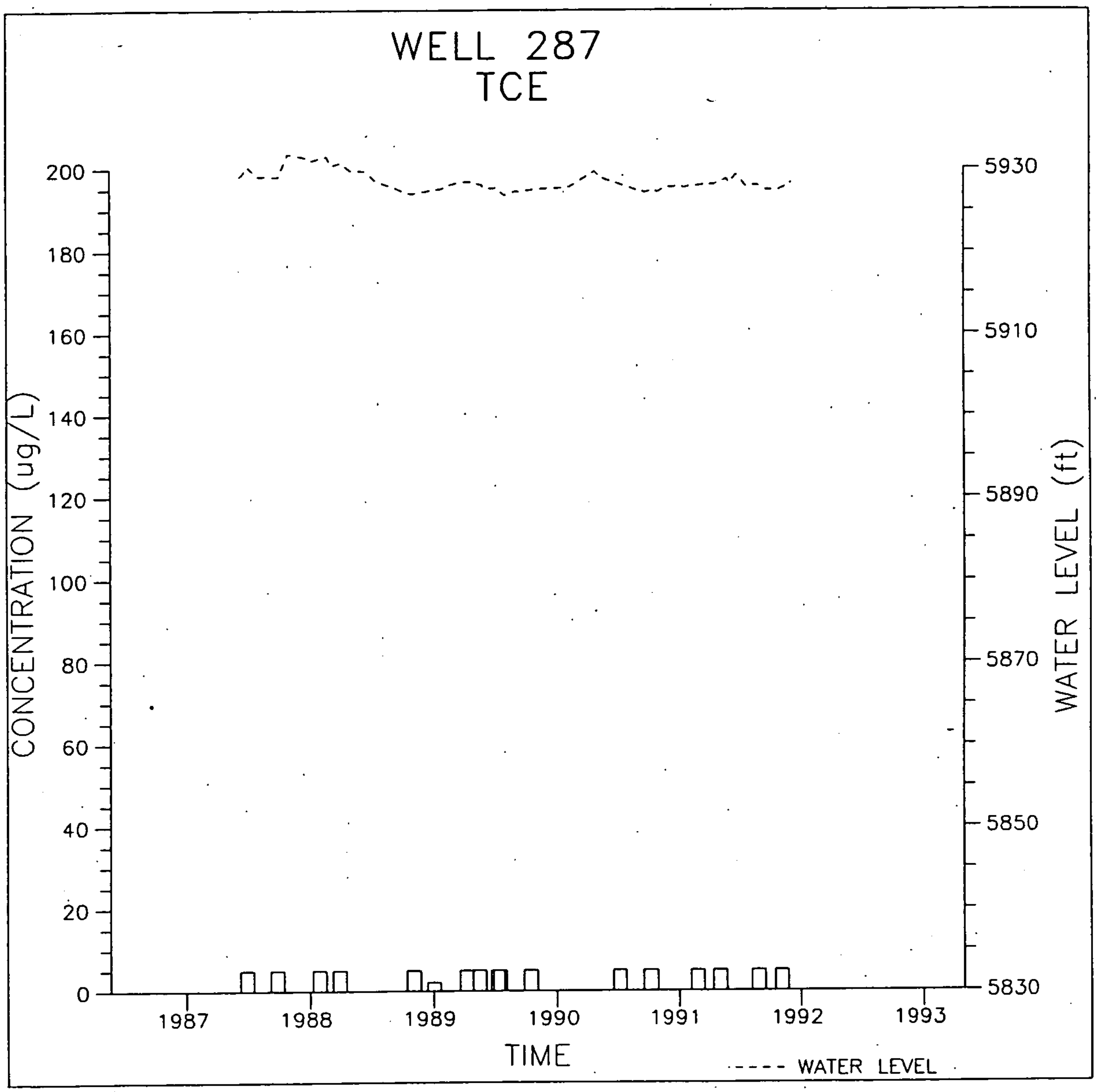
502

503



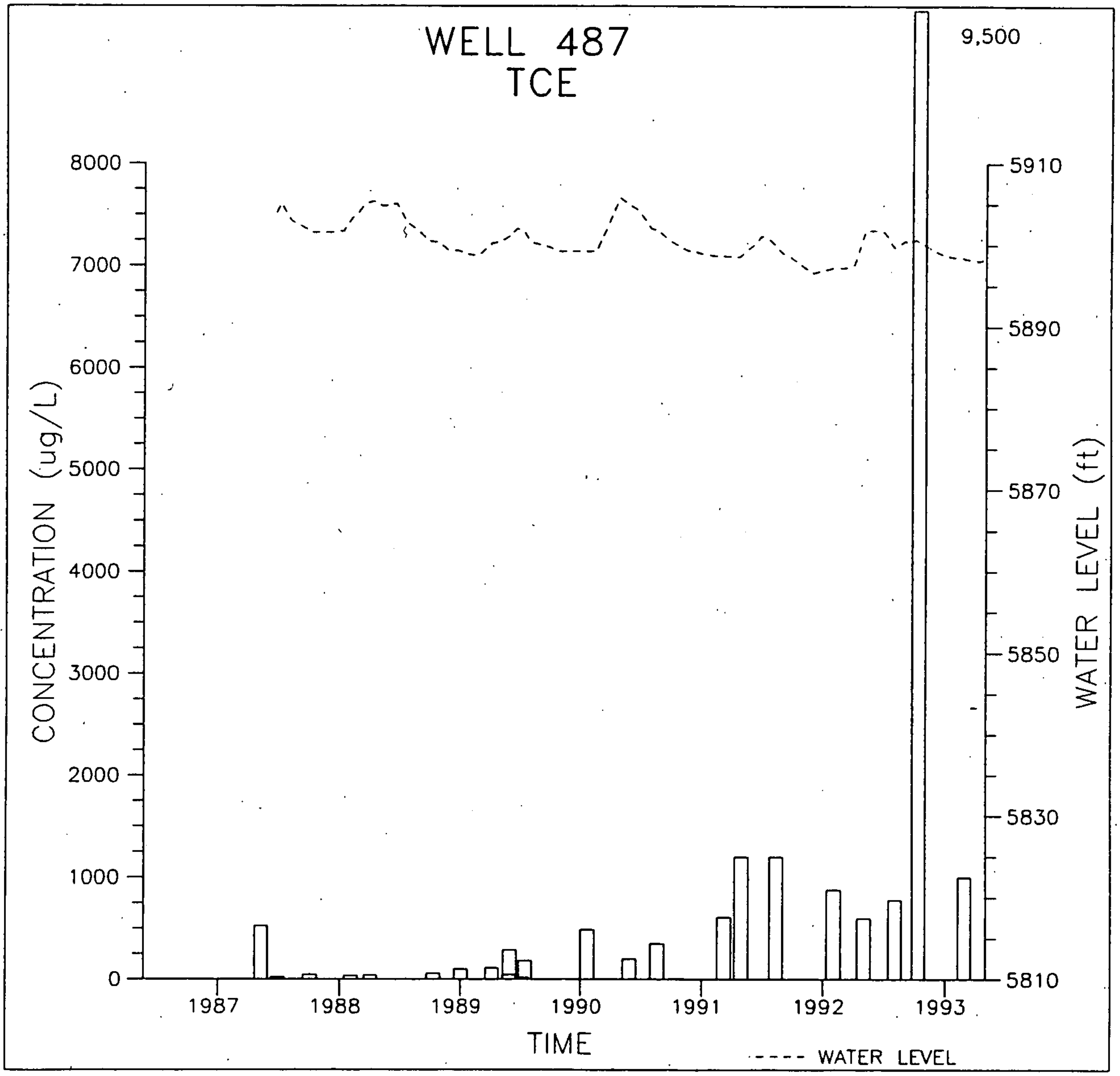
WELL 6286
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

503


WELL 287
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

504

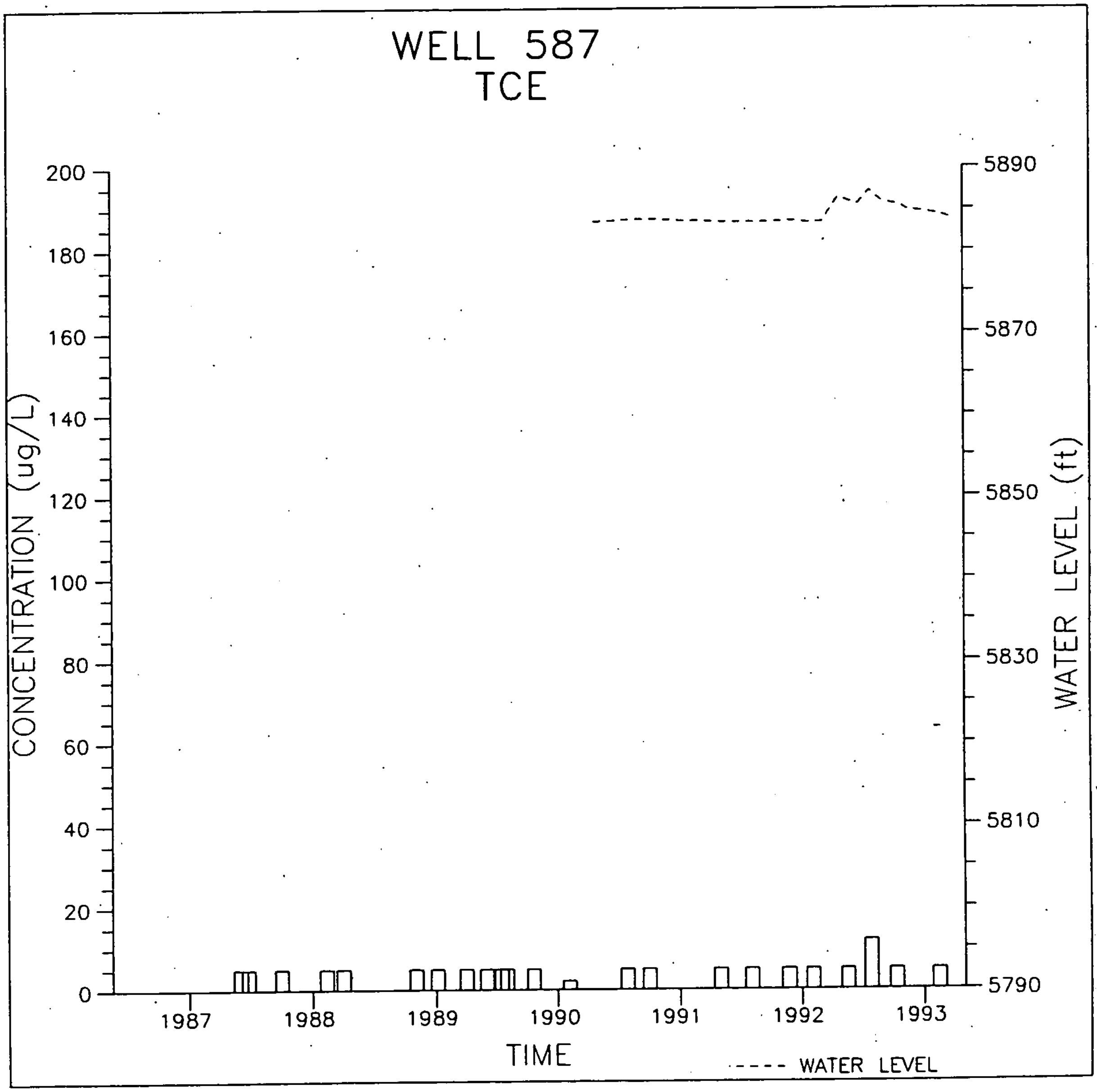
505



WELL 487
TCE
9,500
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

505

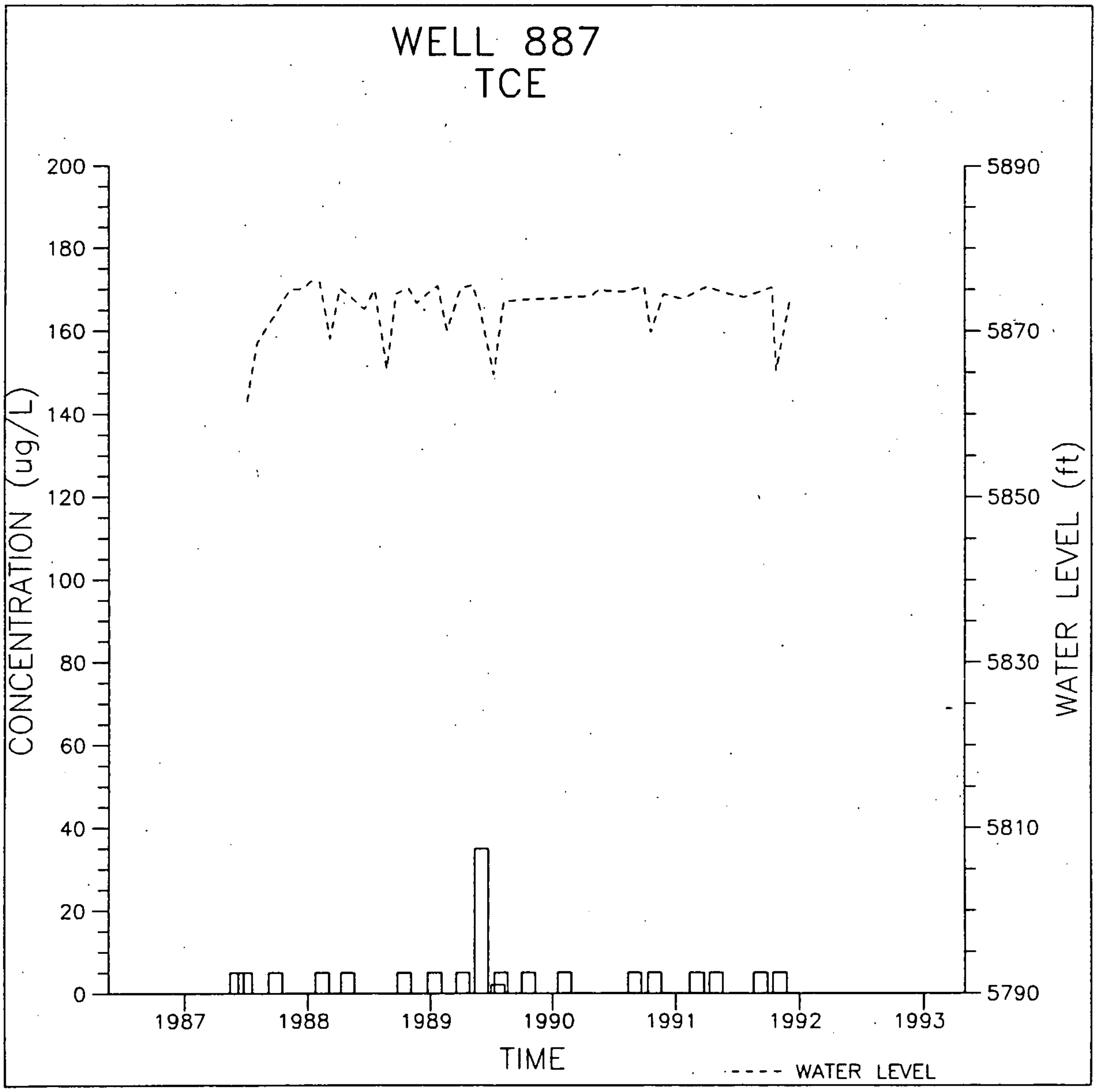
~~506~~



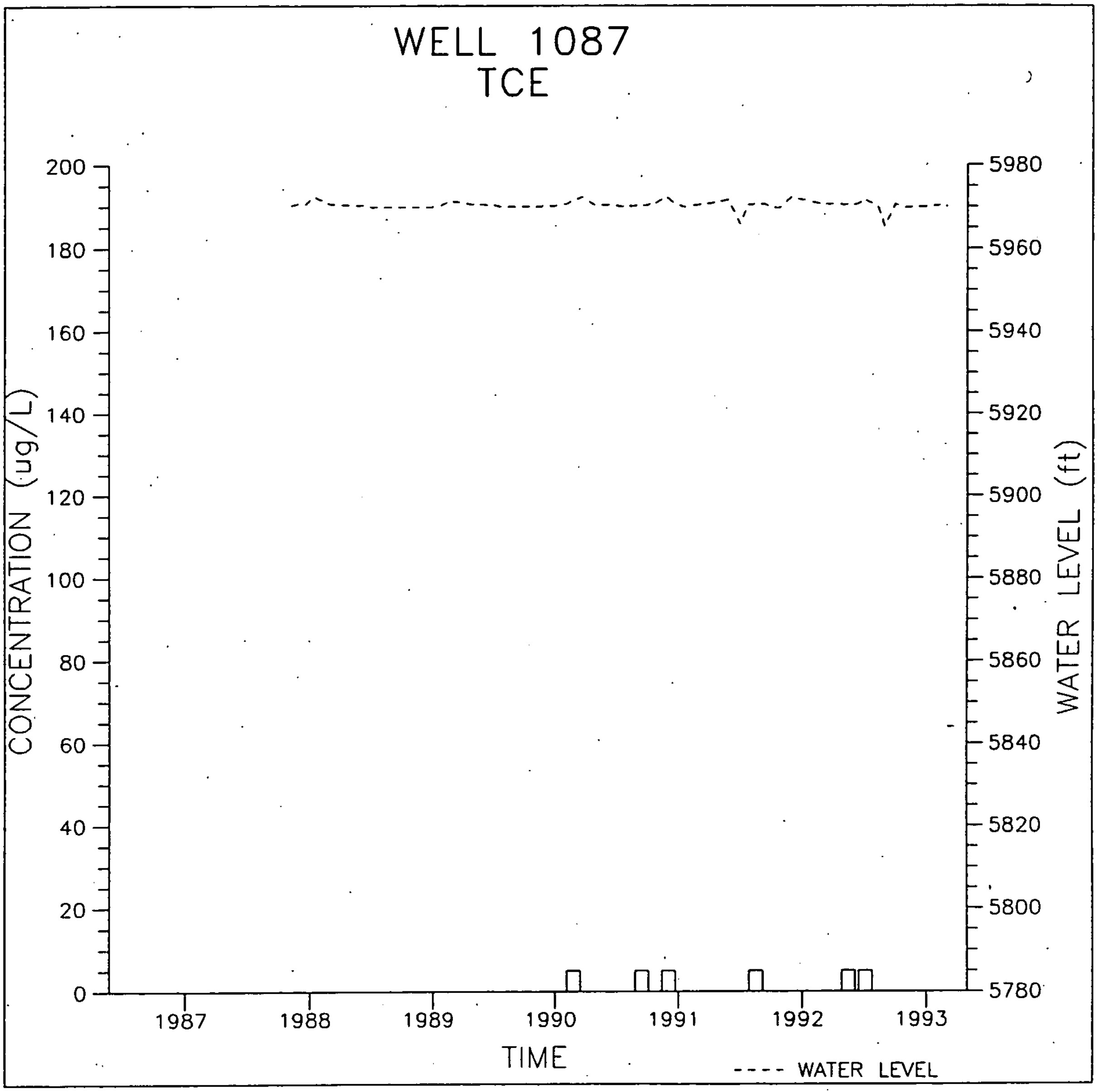
WELL 587
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

506

507

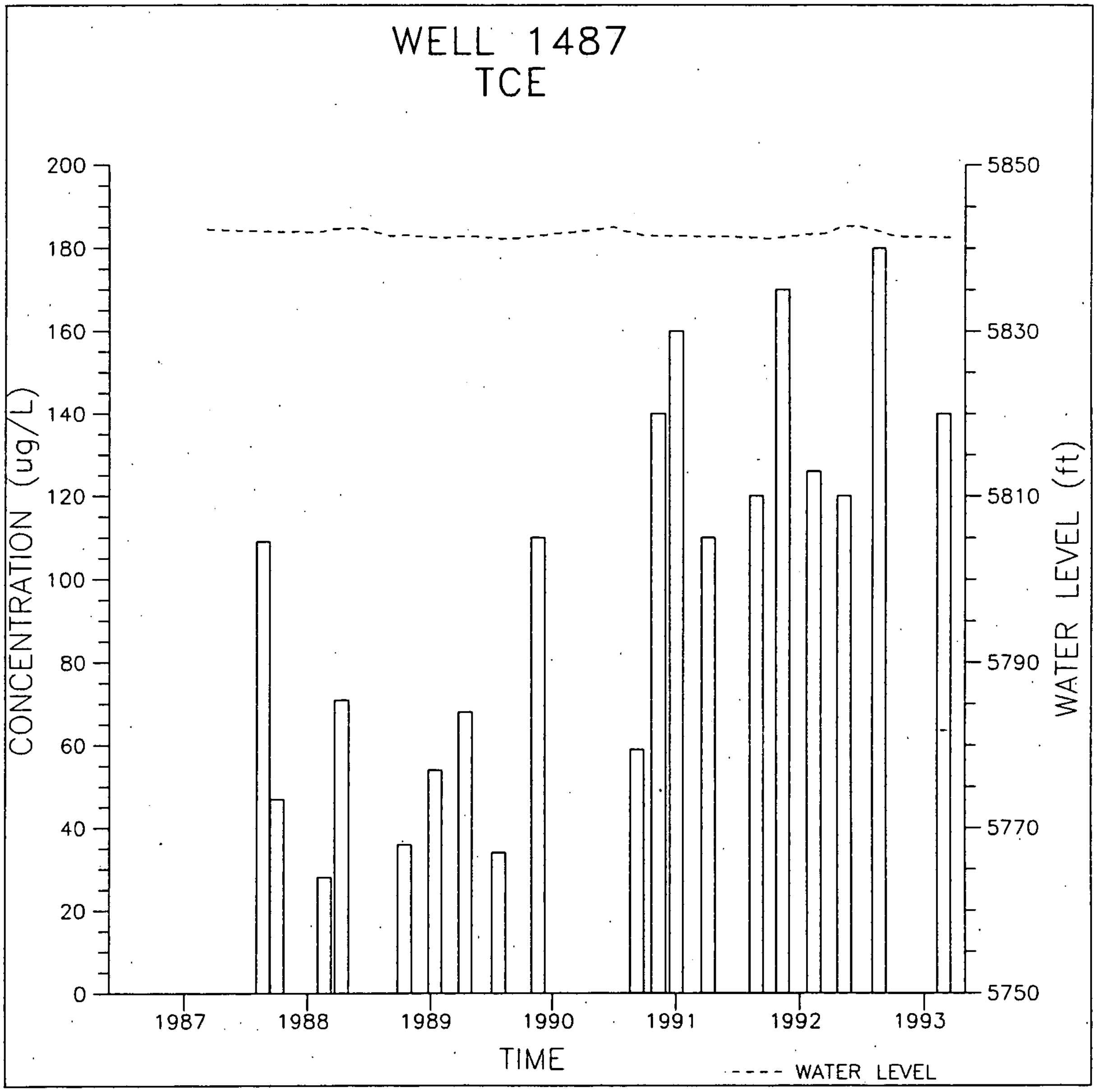

WELL 887
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

507



WELL 1087
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

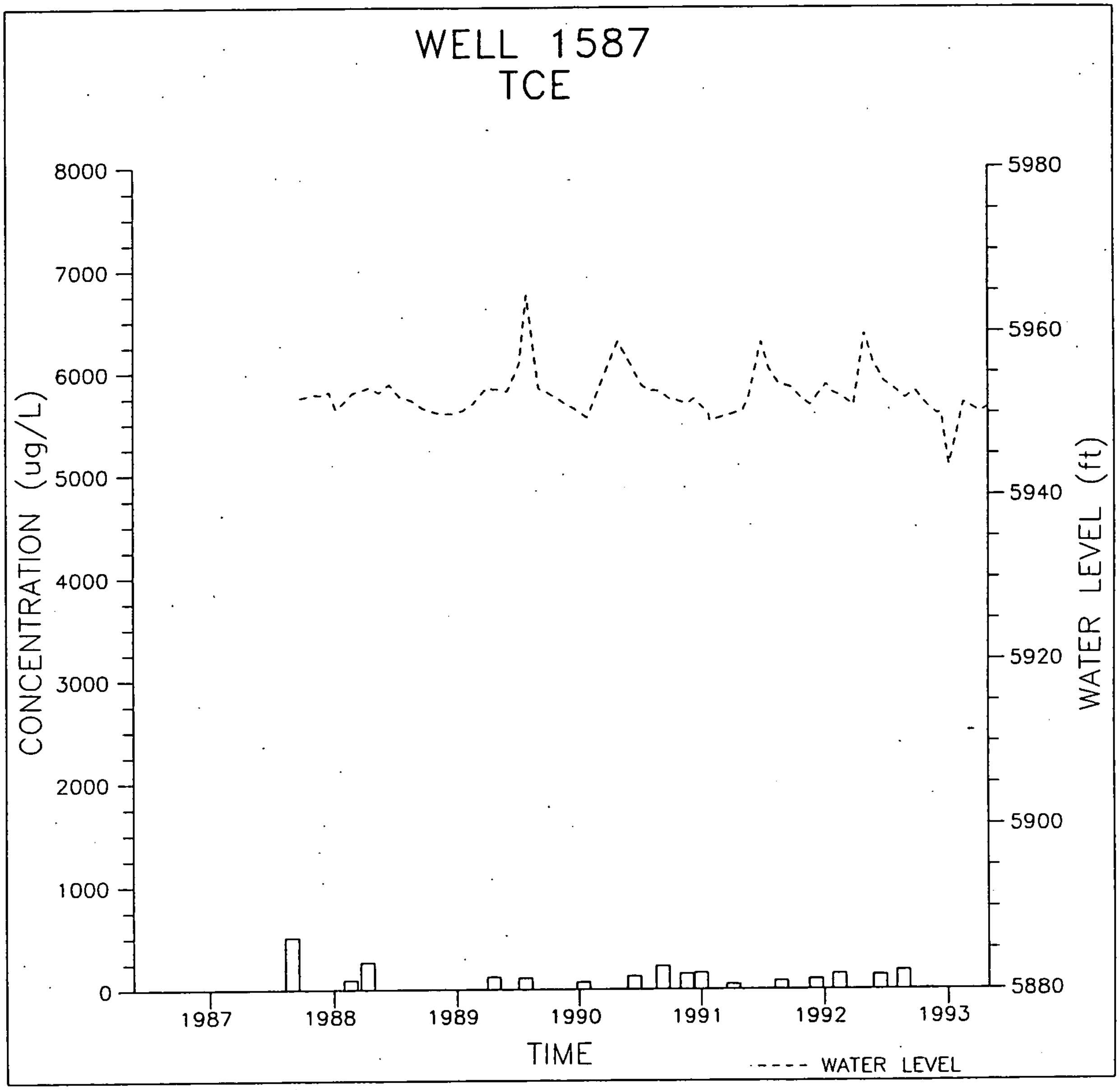
508

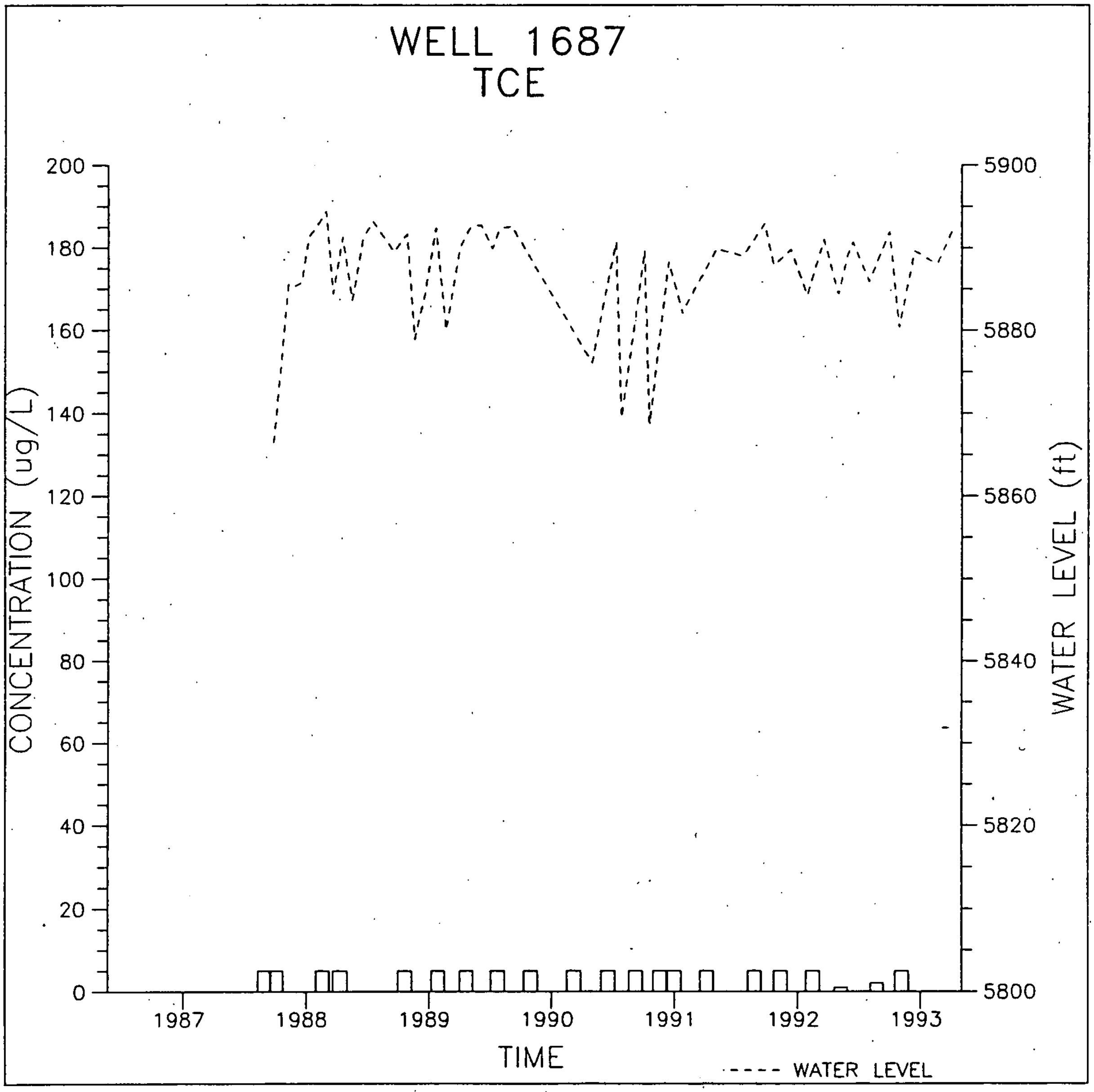


WELL 1487
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5850
5830
5810
5790
5770
5750
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

509

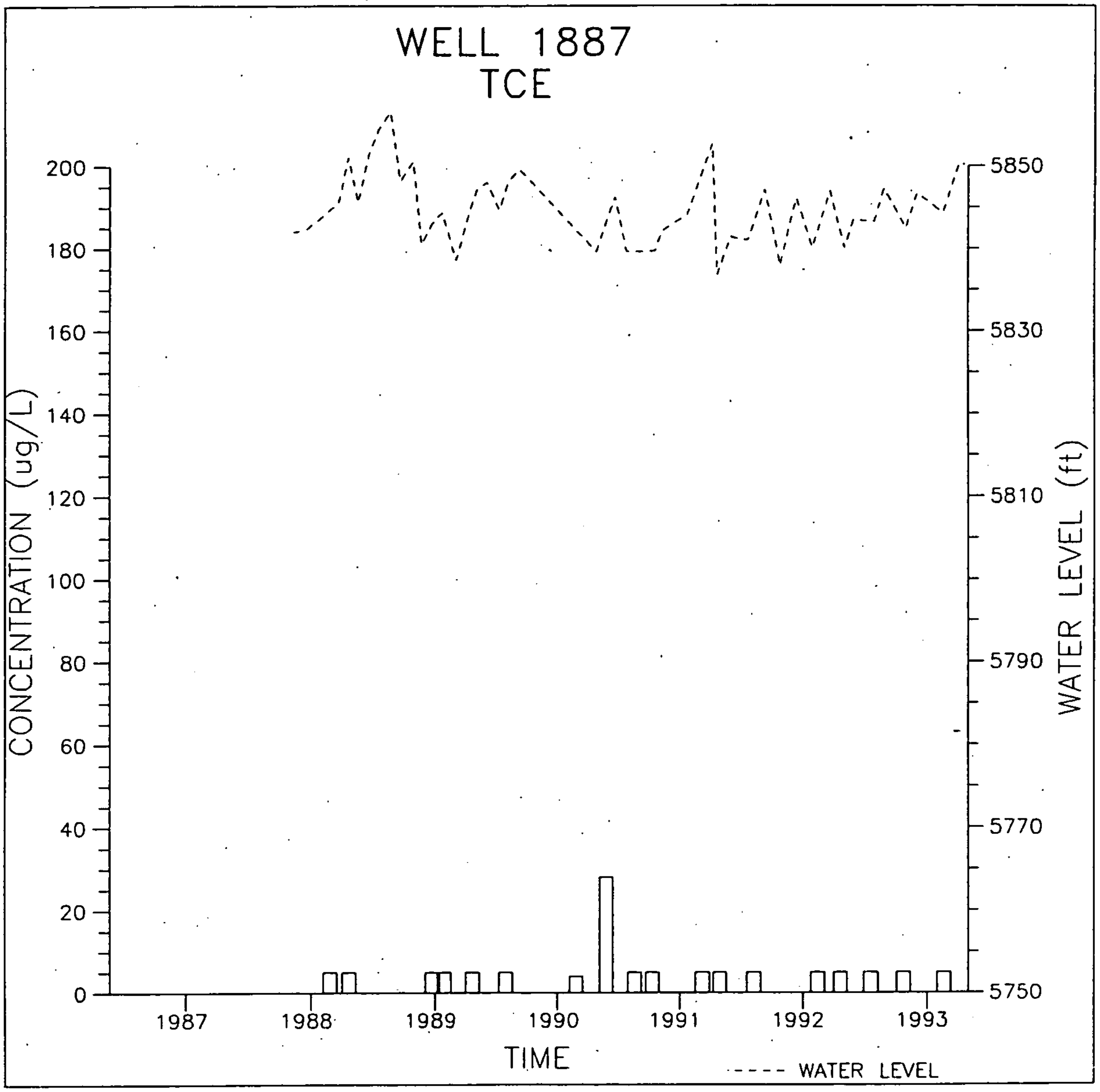
510


WELL 1587
TCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL 1687
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

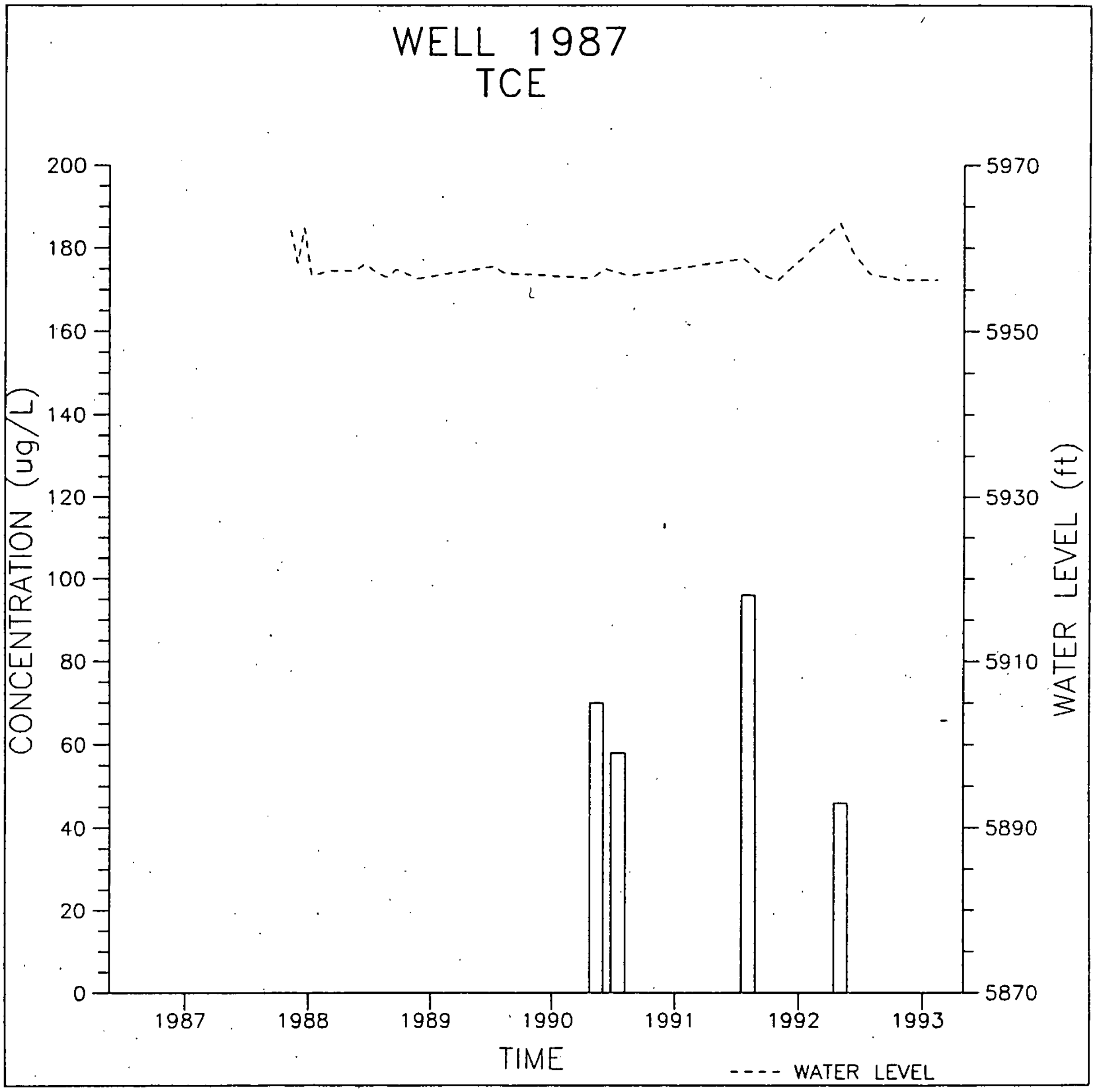
511



WELL 1887
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

512

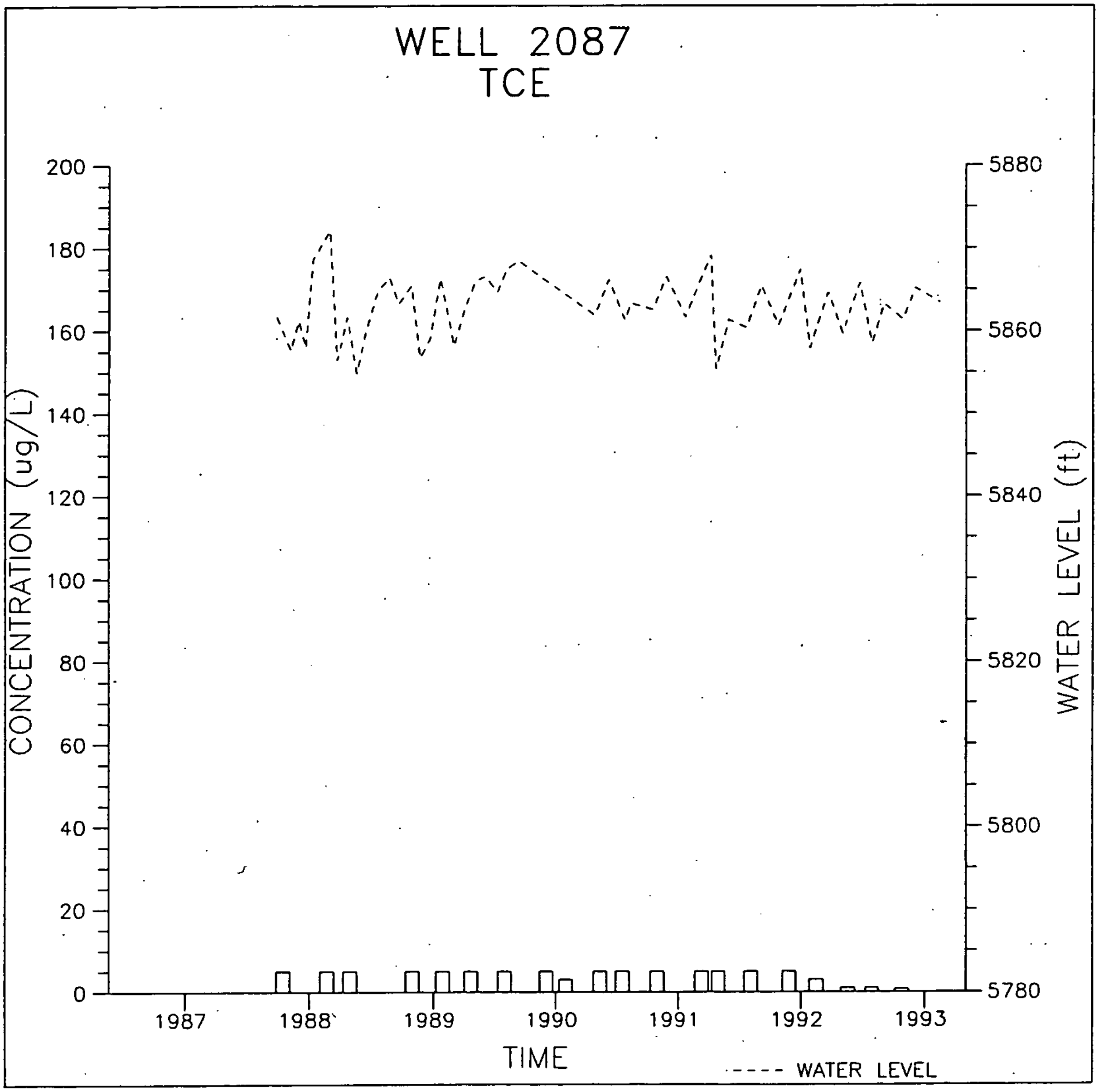
513



WELL 1987
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

513

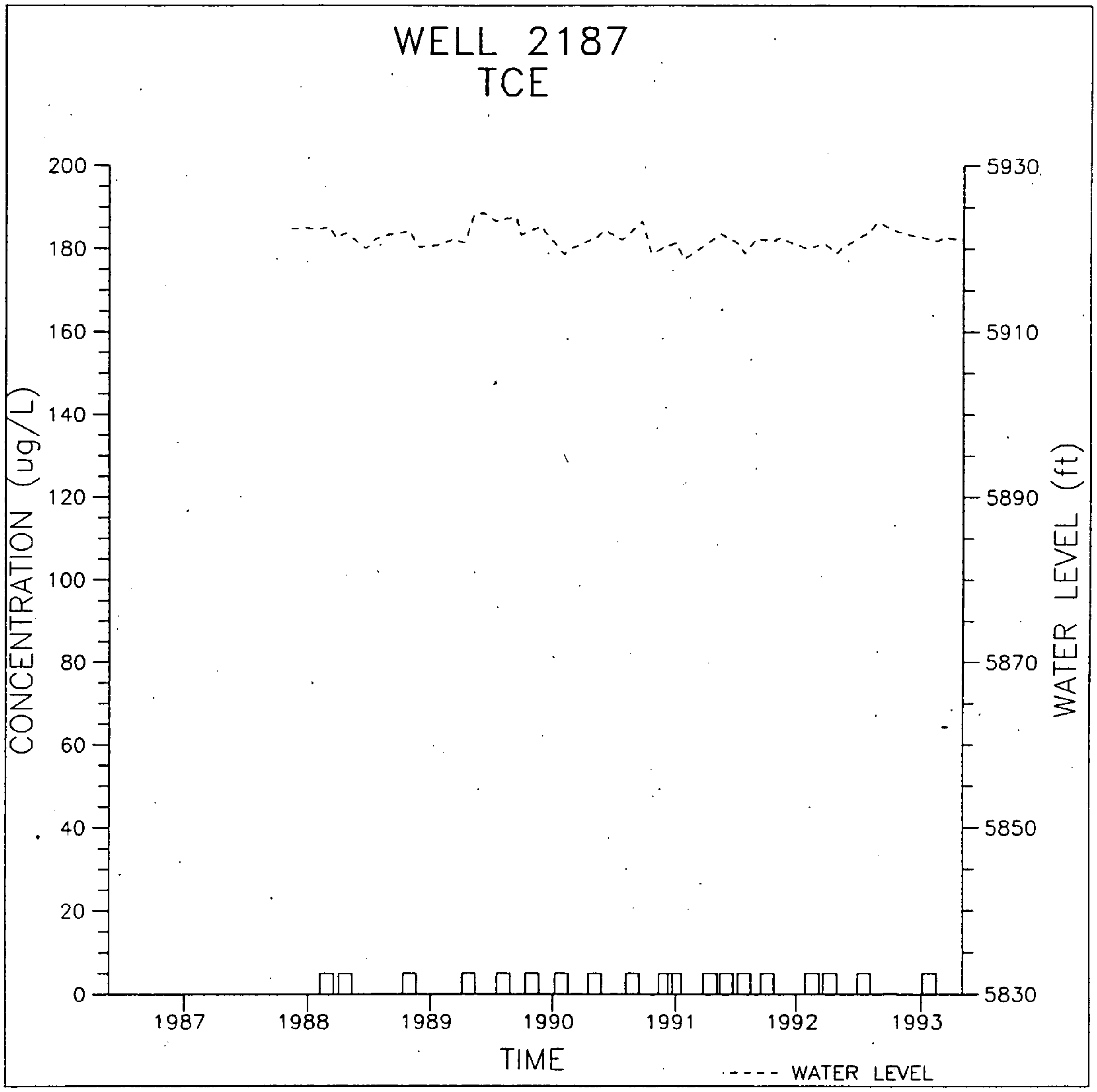
514



WELL 2087
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

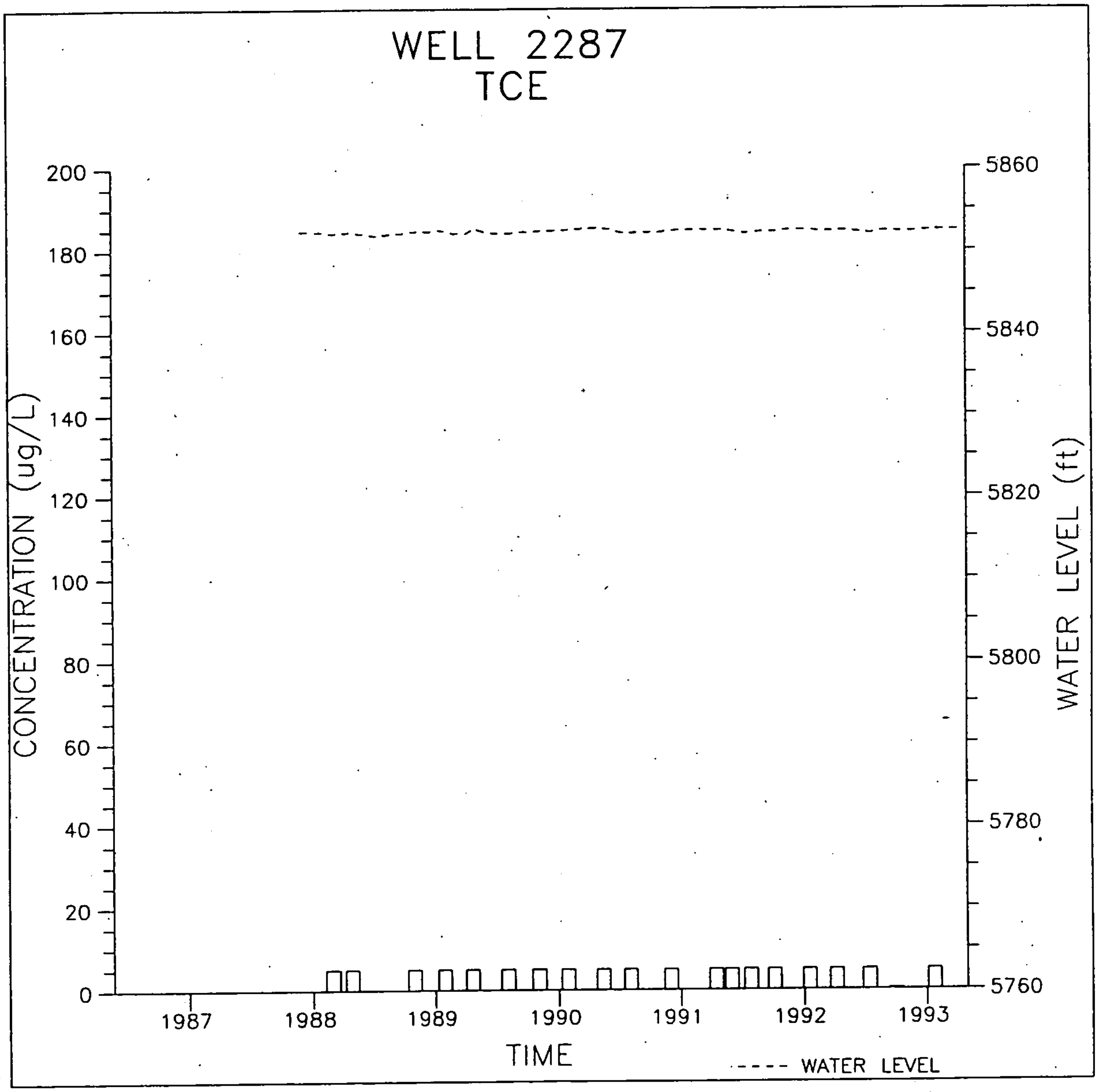
514

515


WELL 2187
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

515

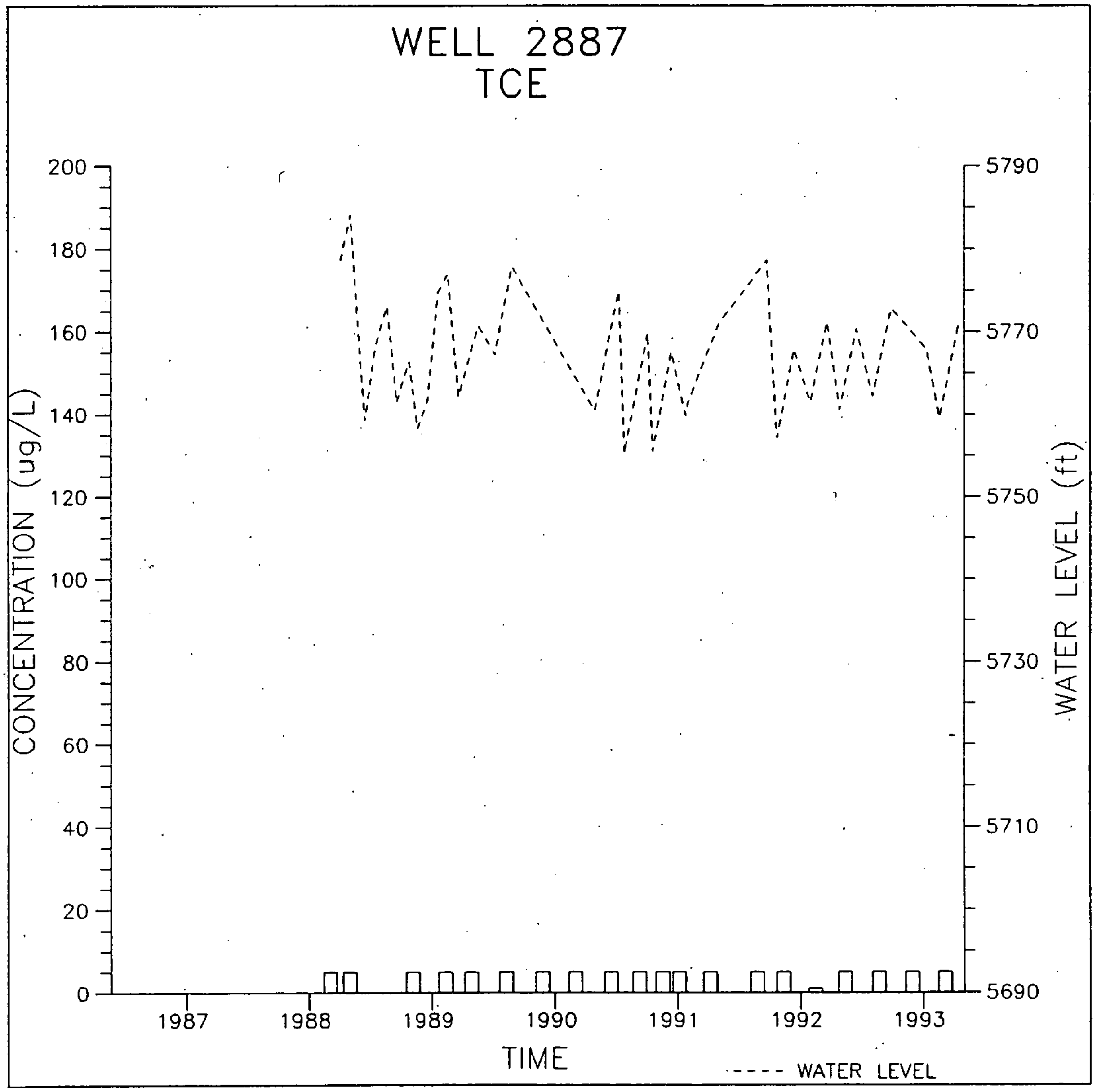
516



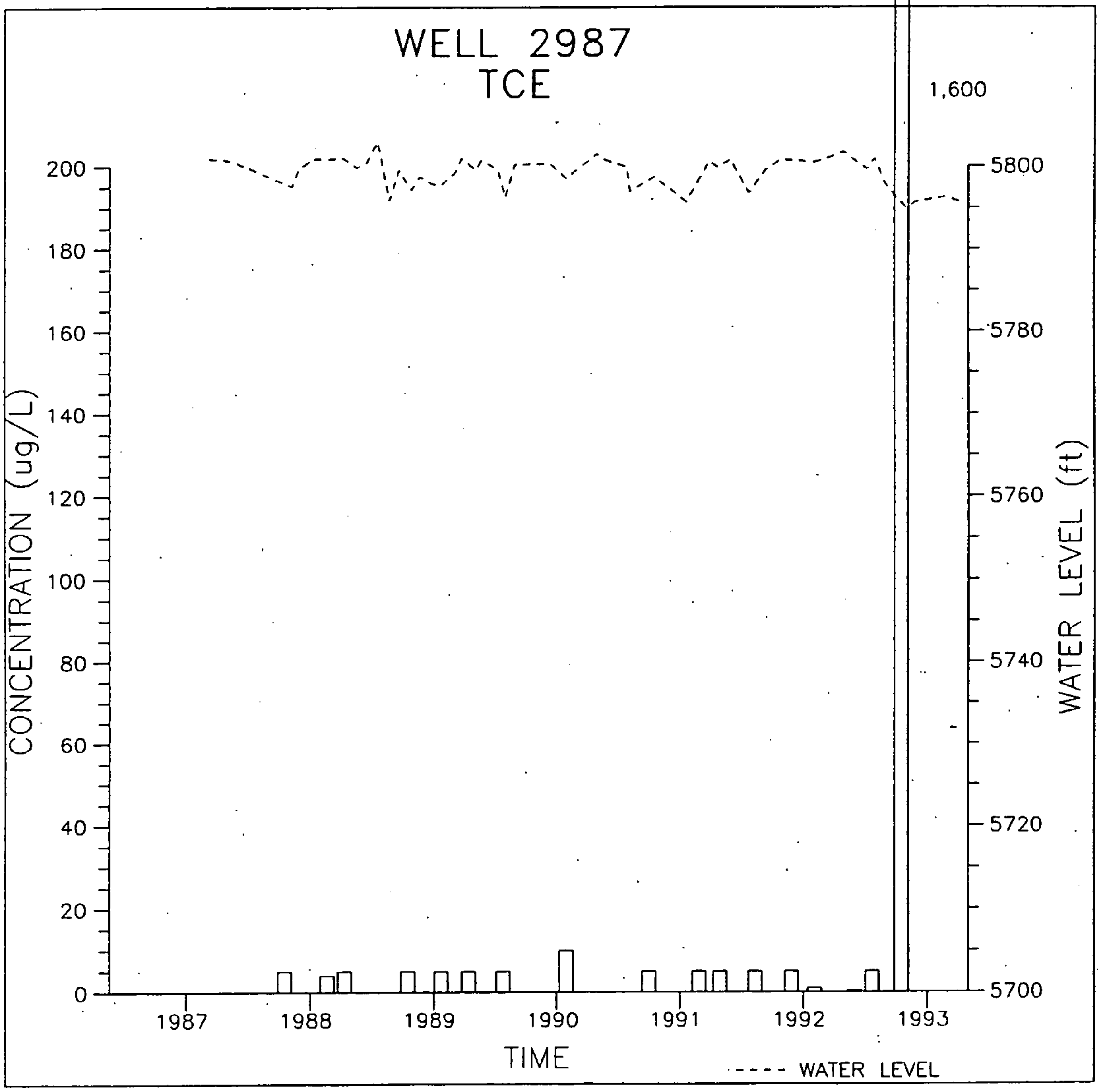
WELL 2287
TCE
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5860
5840
5820
5800
5780
5760
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

516

517


WELL 2887
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

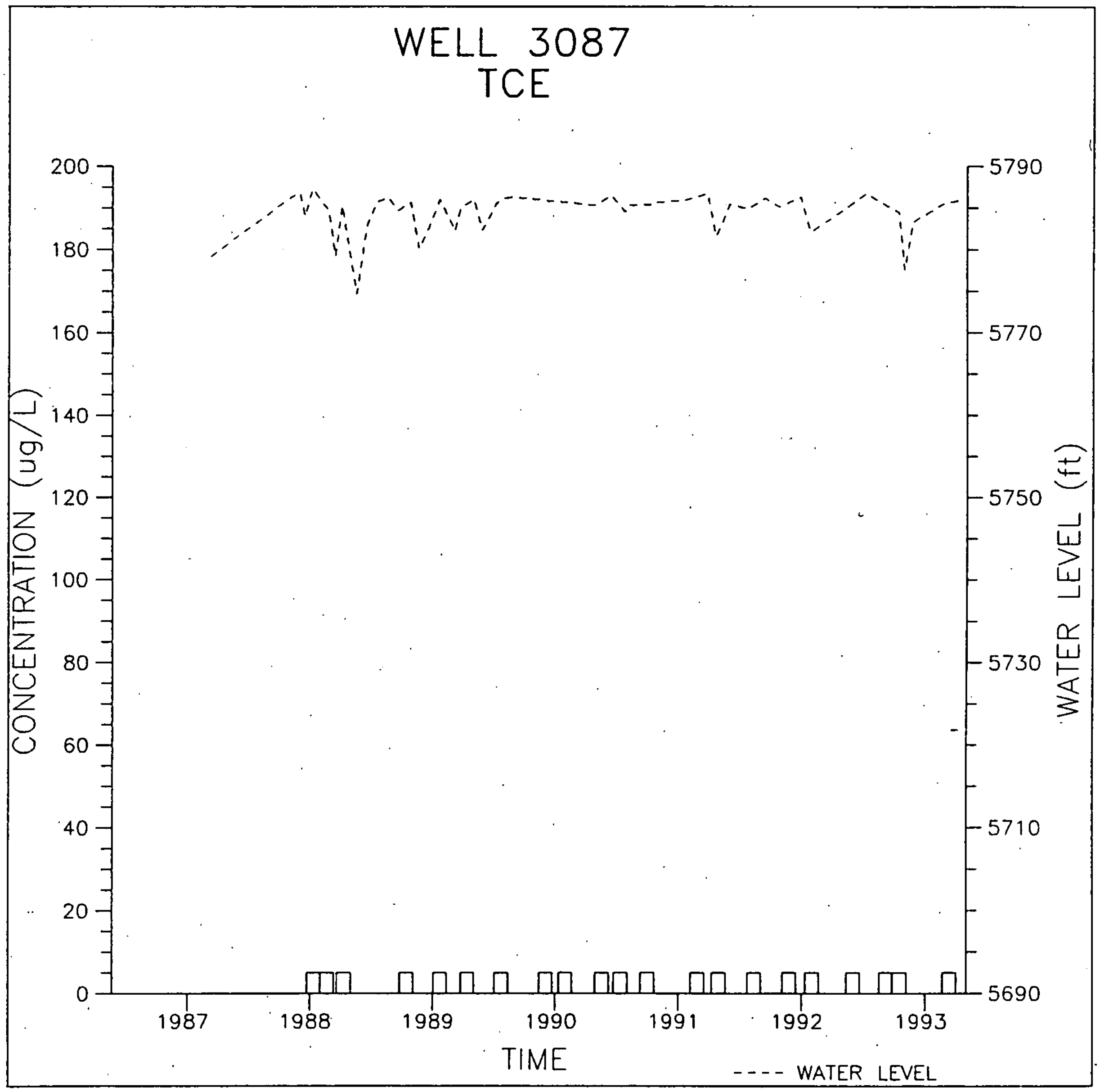
517



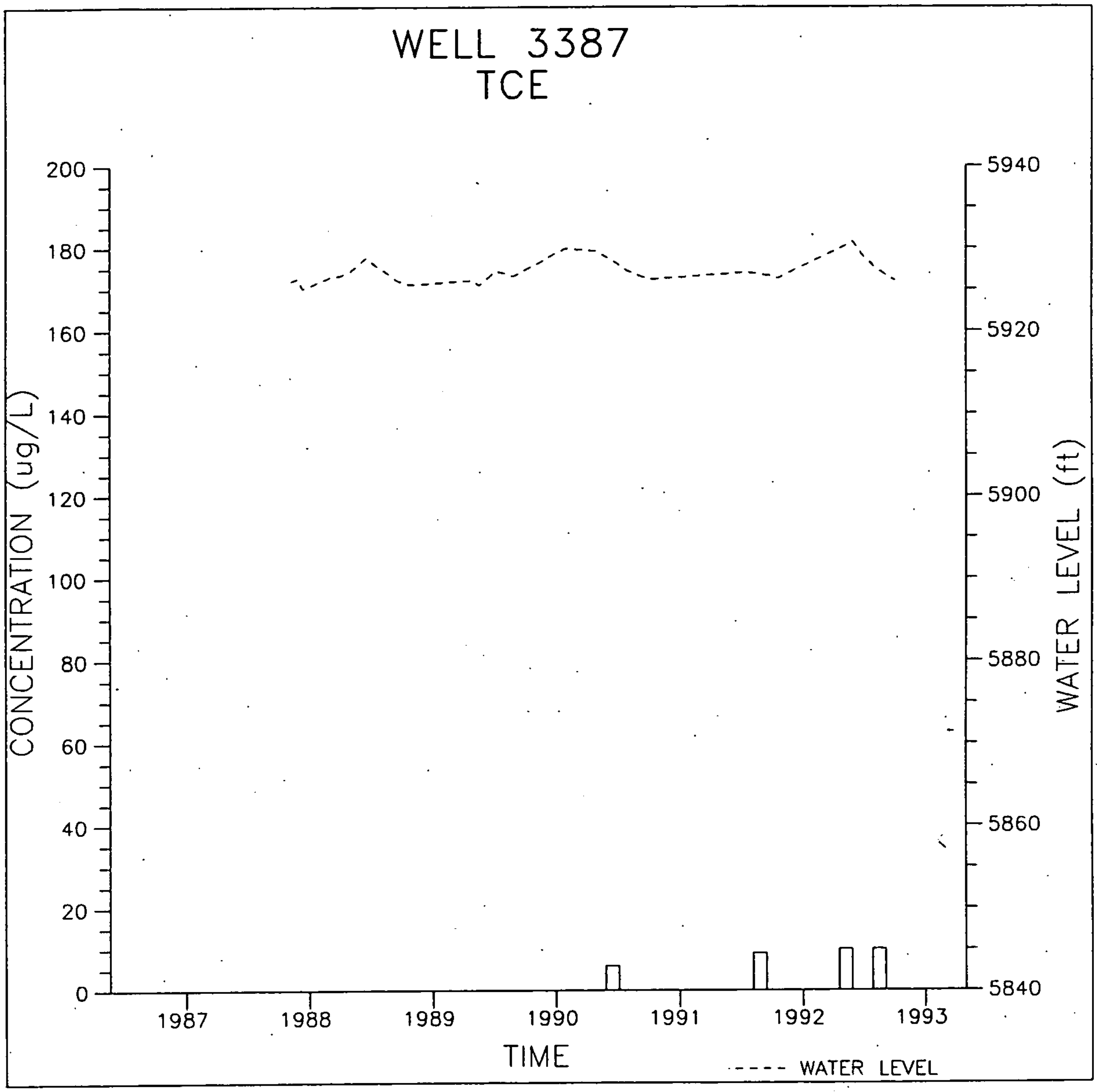
WELL 2987
TCE
1,600
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5800
5780
5760
5740
5720
5700
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

518

~~519~~

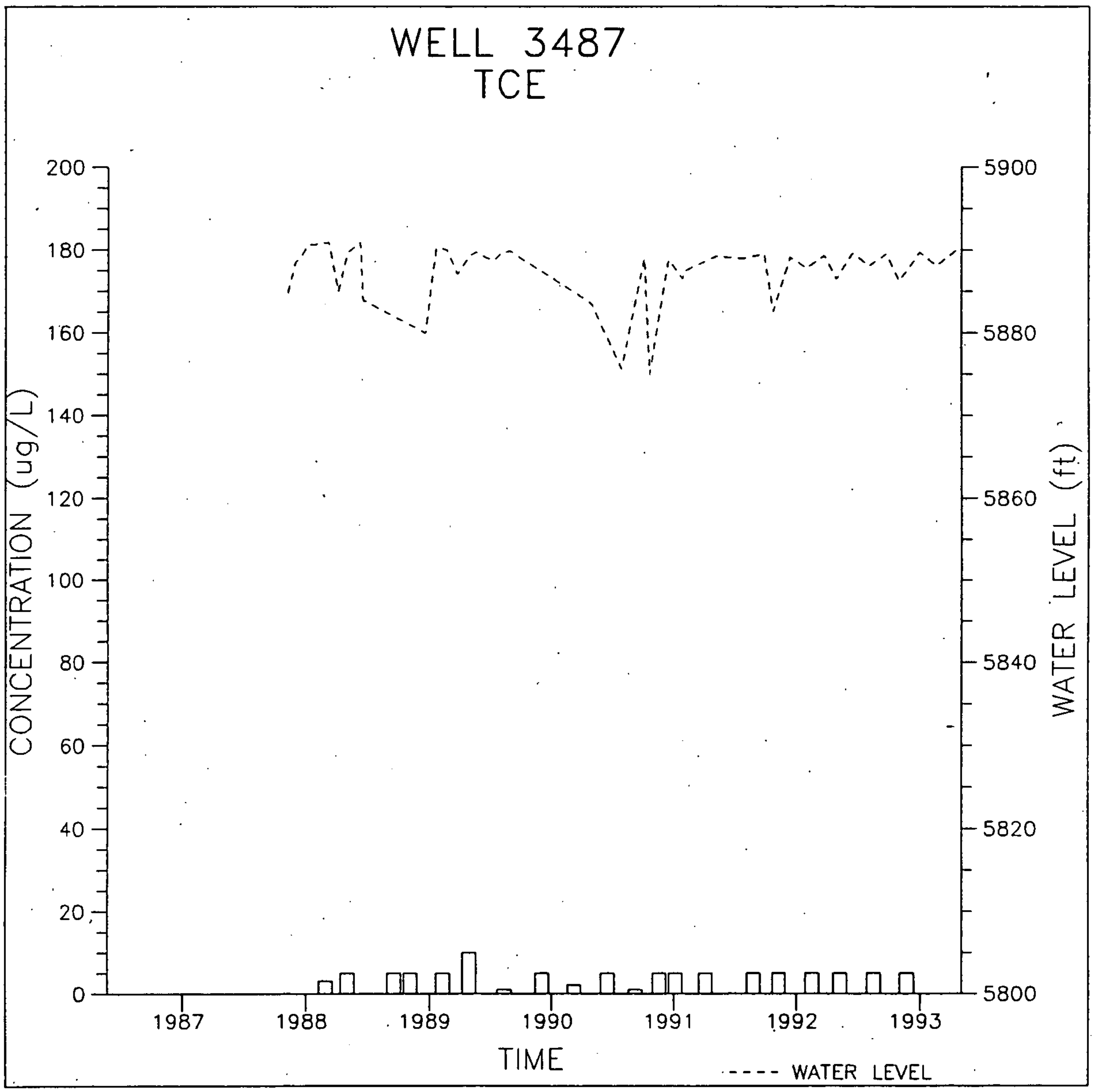

WELL 3087
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

519



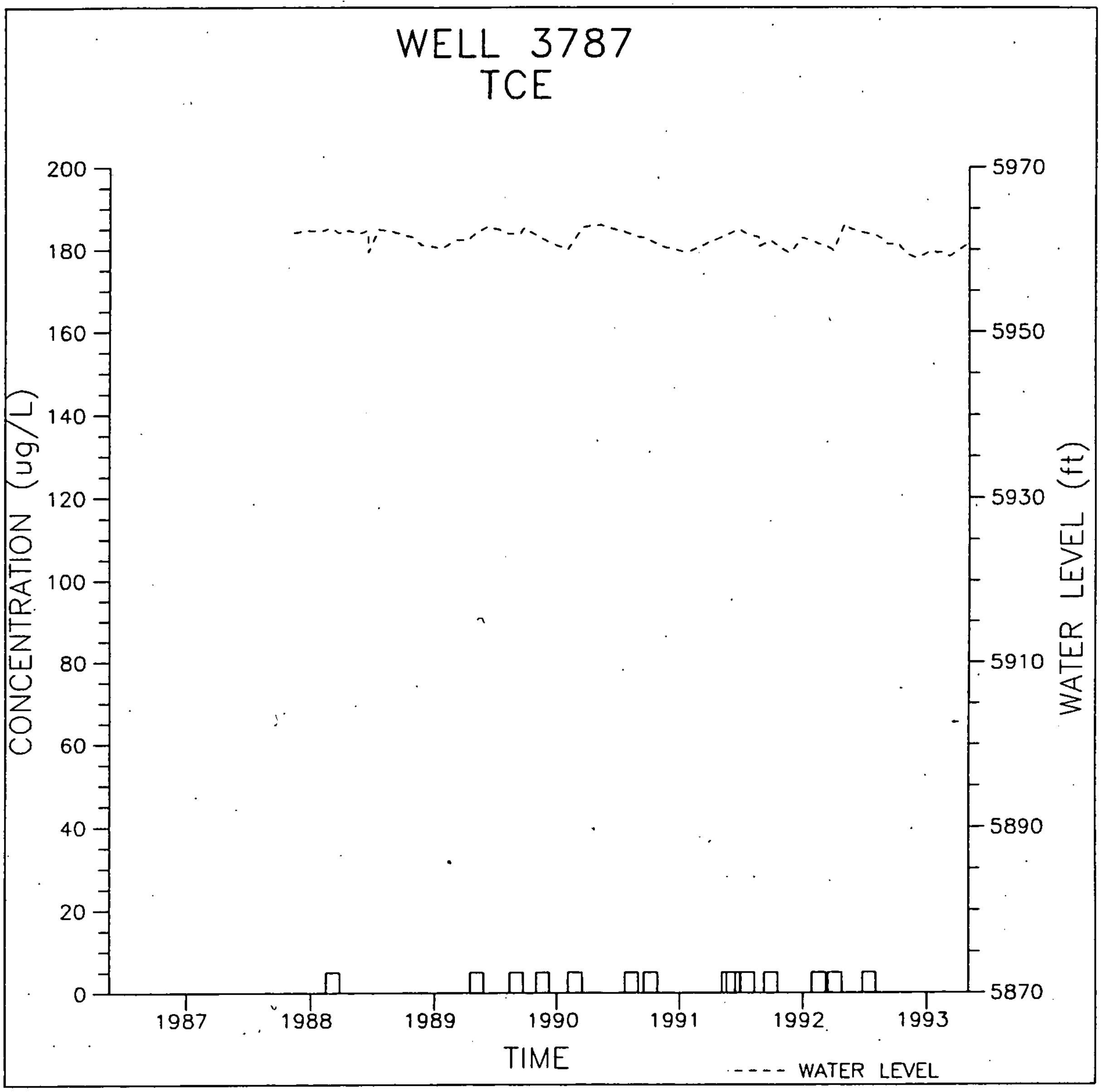
WELL 3387
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

520



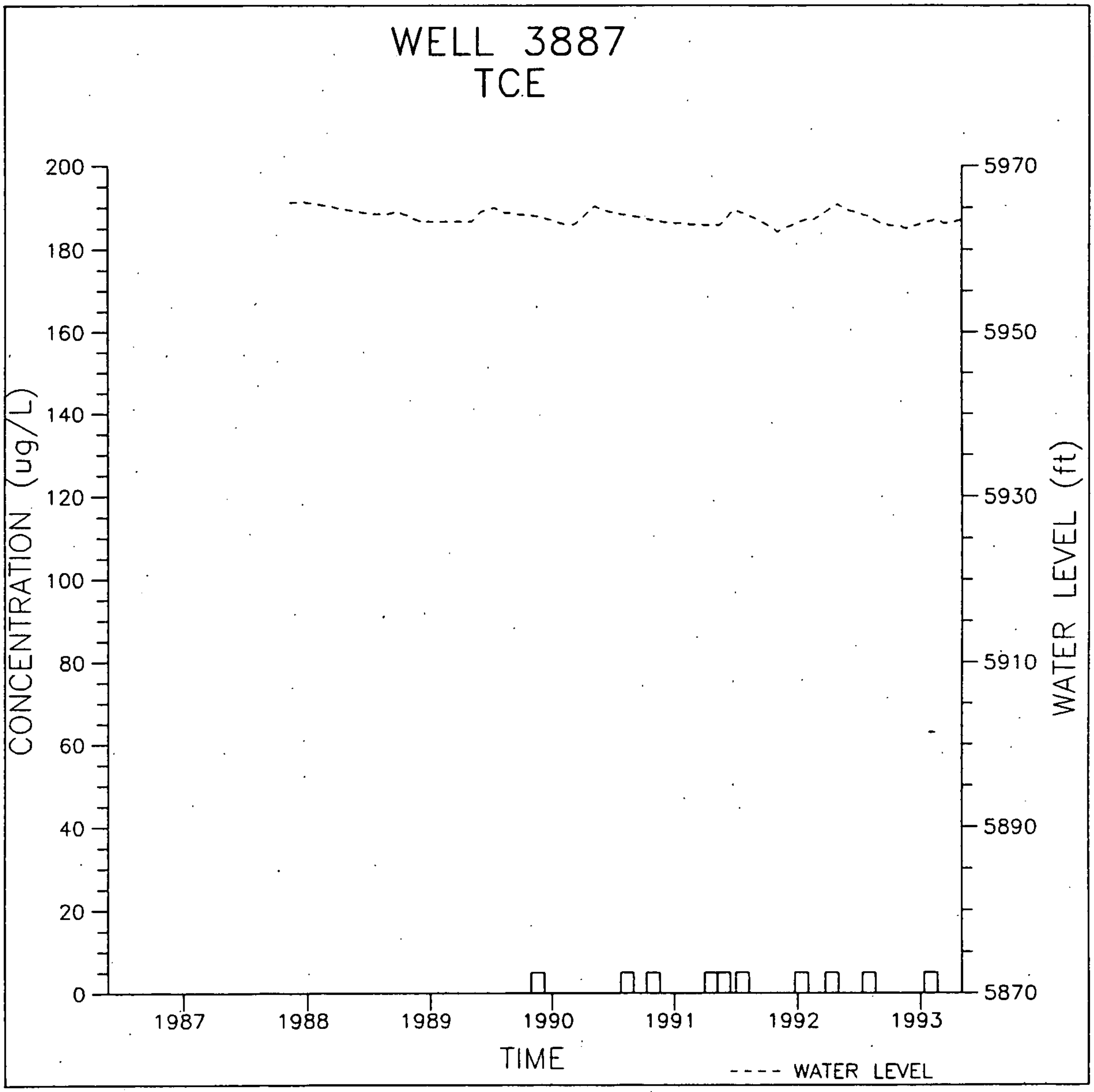
WELL 3487
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20
40
60
80
100
120
140
160
180
200
5800
5820
5840
5860
5880
5900
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

521

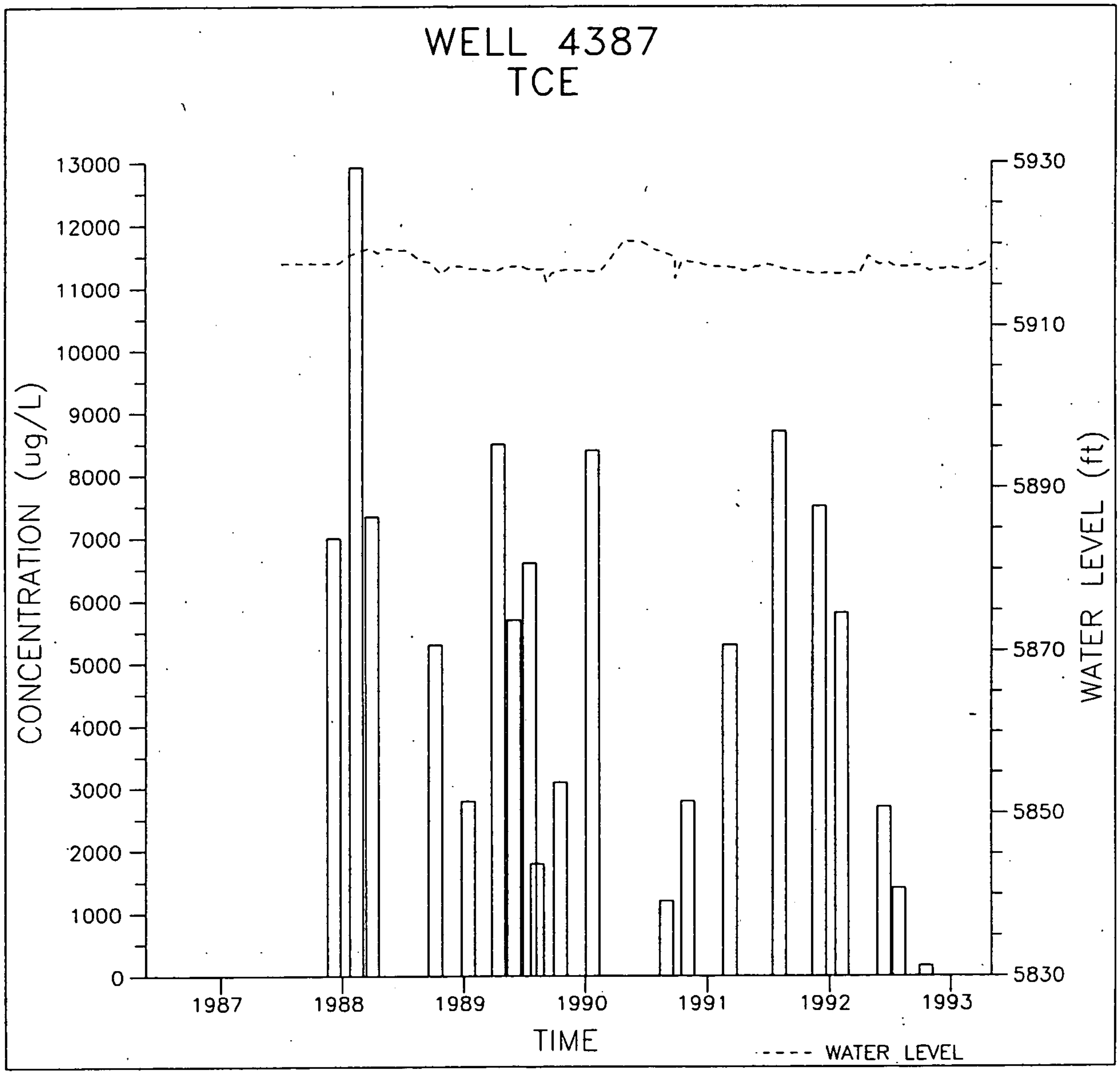

WELL 3787
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

522

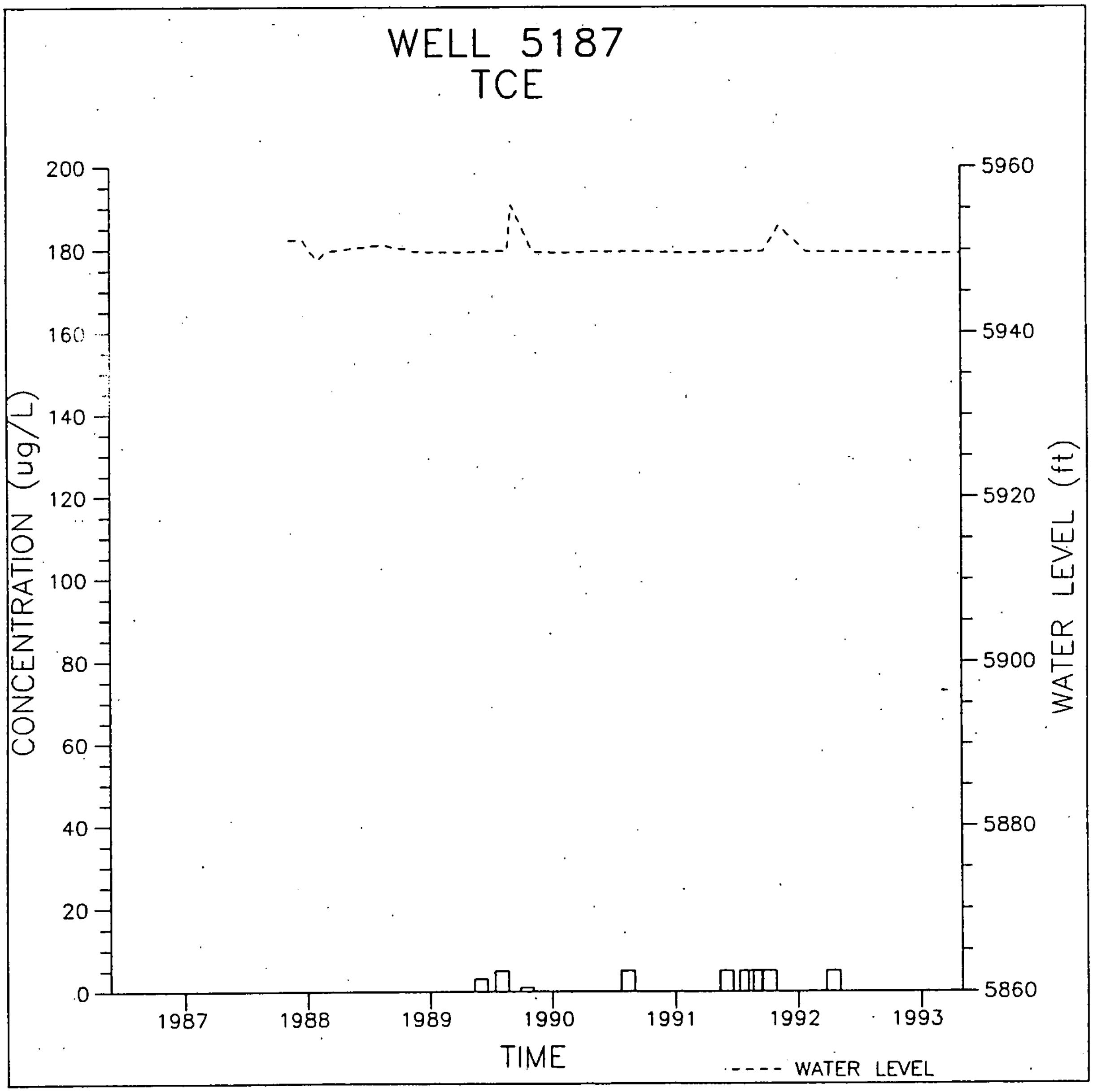
523


WELL 3887
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

523

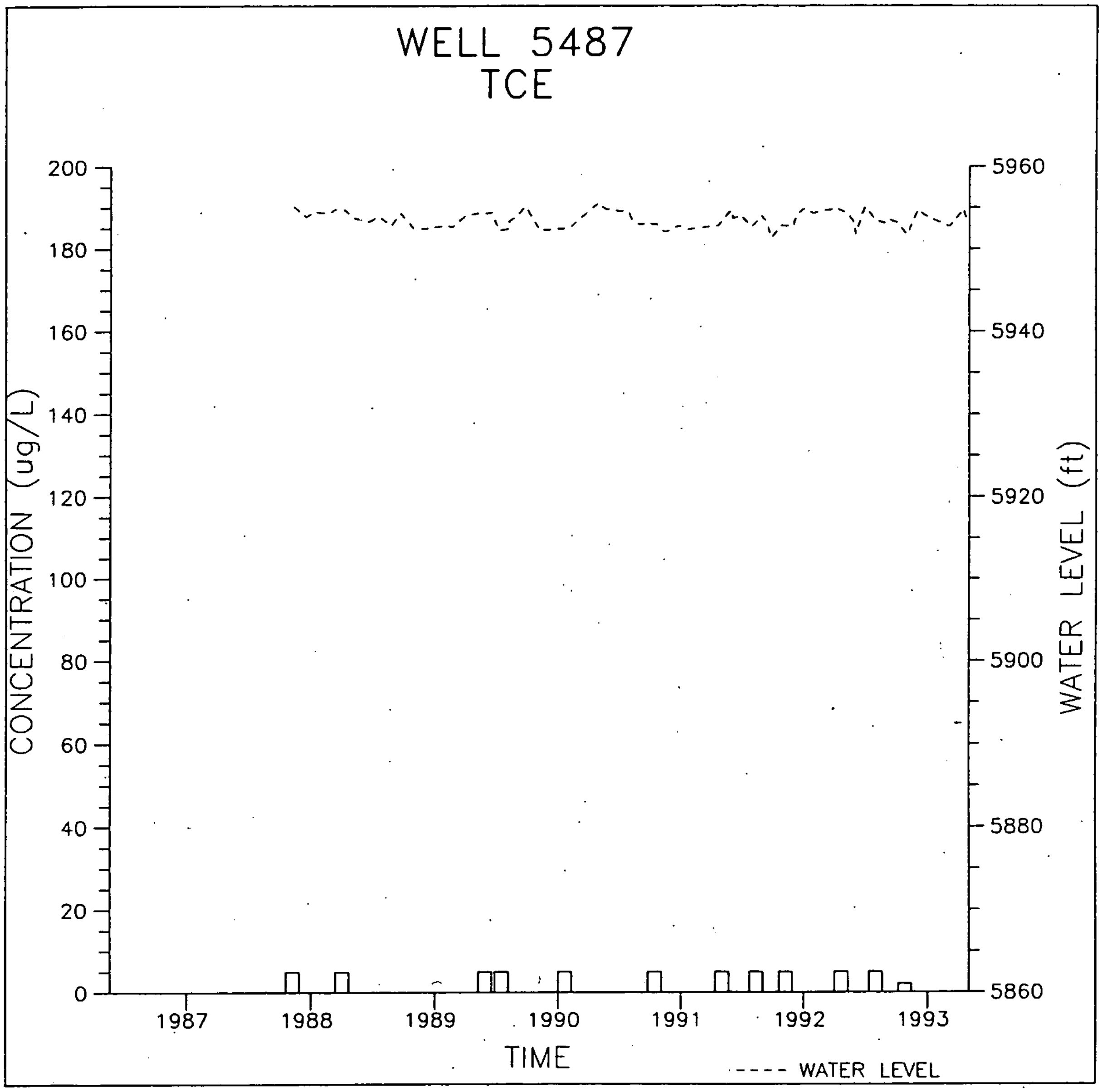

WELL 4387
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

524



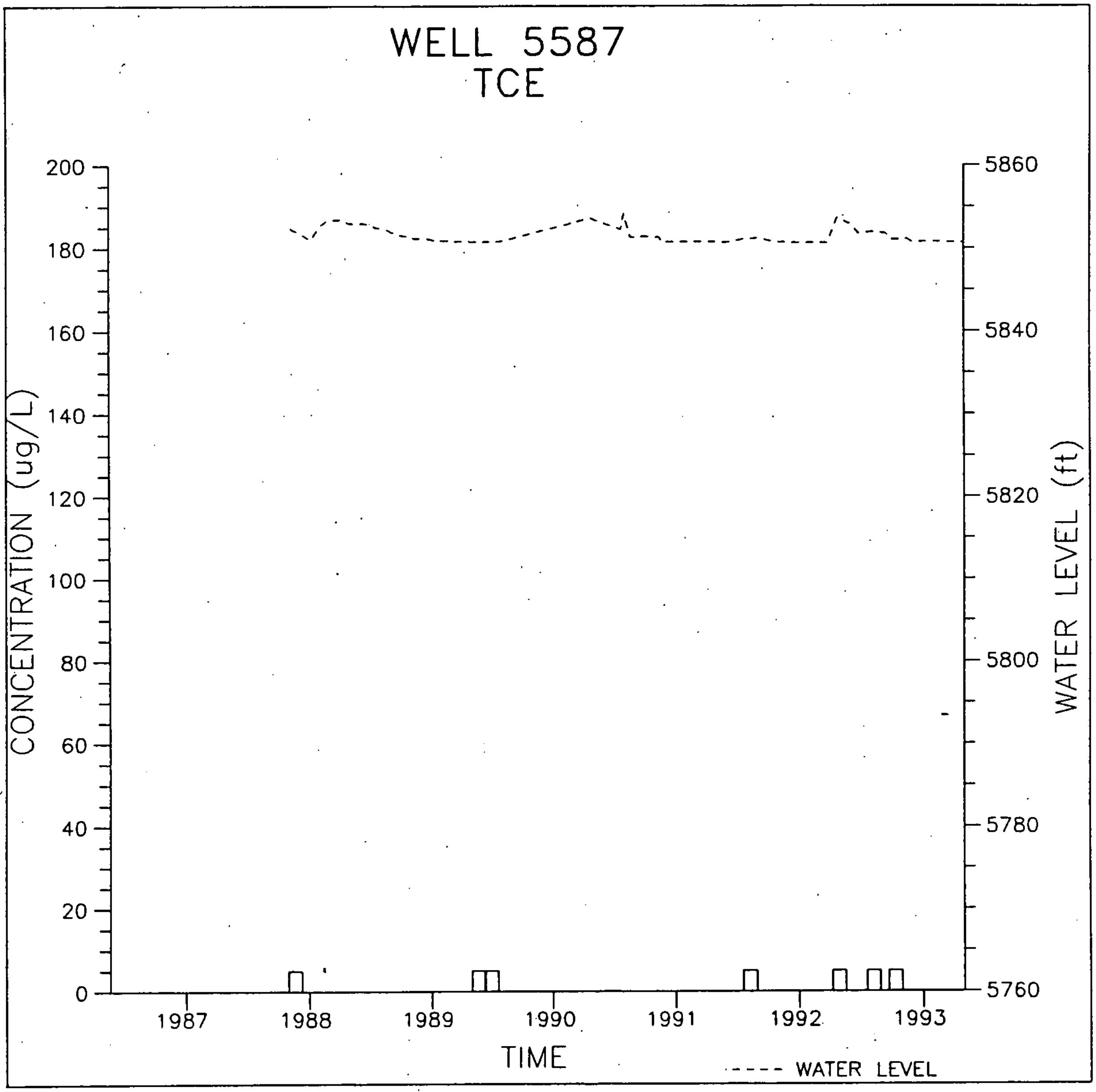
WELL 5187
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

525


WELL 5487
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

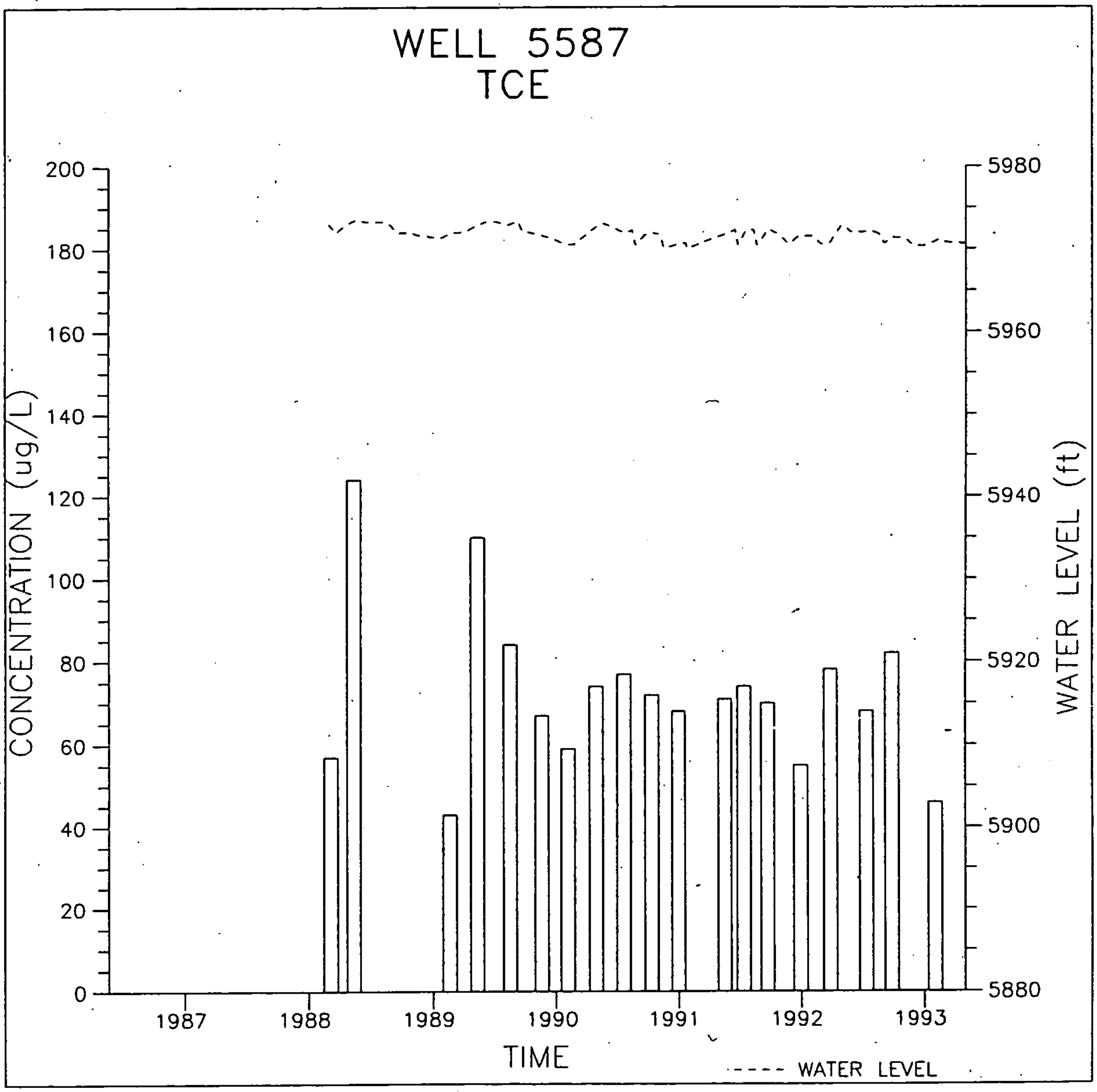
526

627

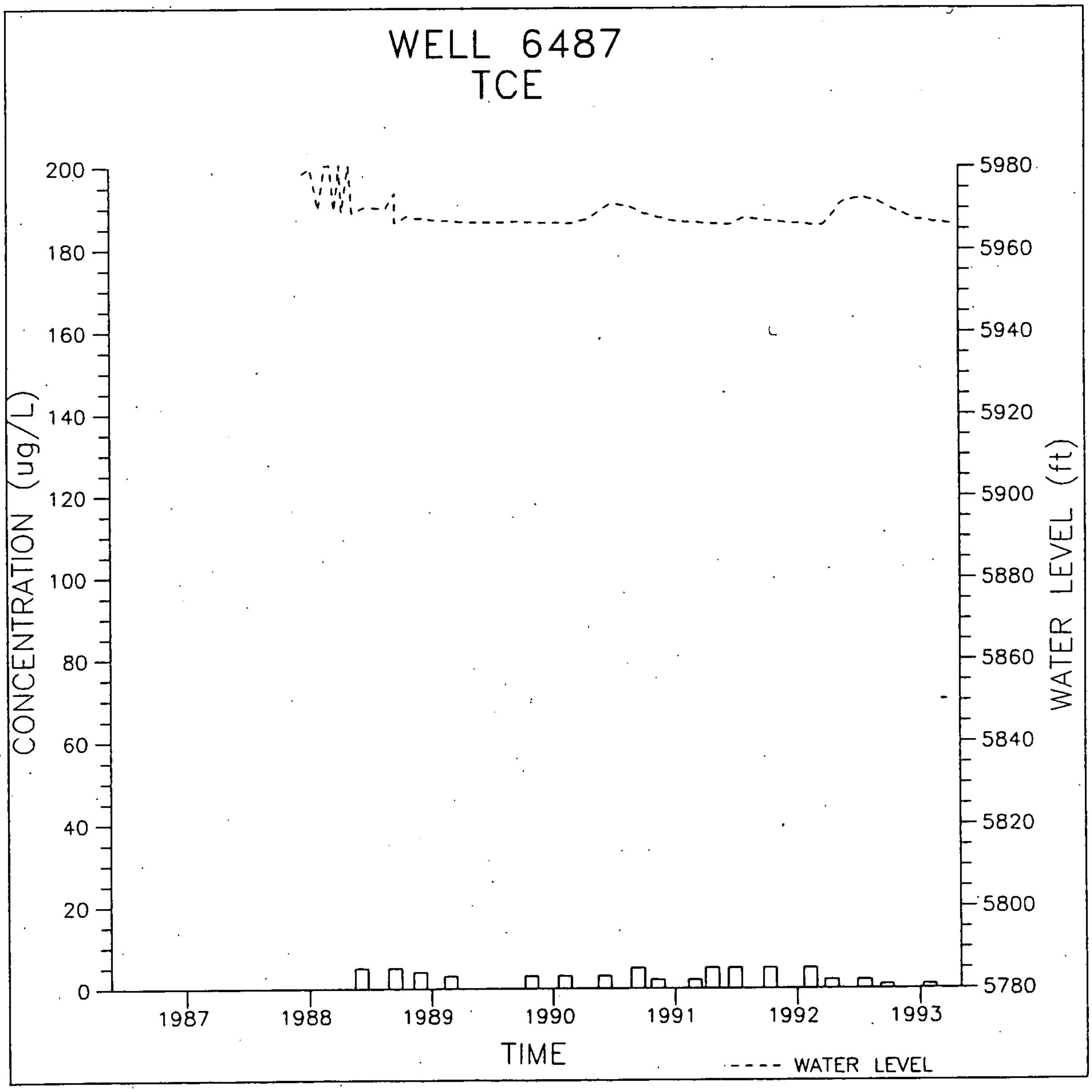


WELL 5587
TCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5760
5780
5800
5820
5840
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

521

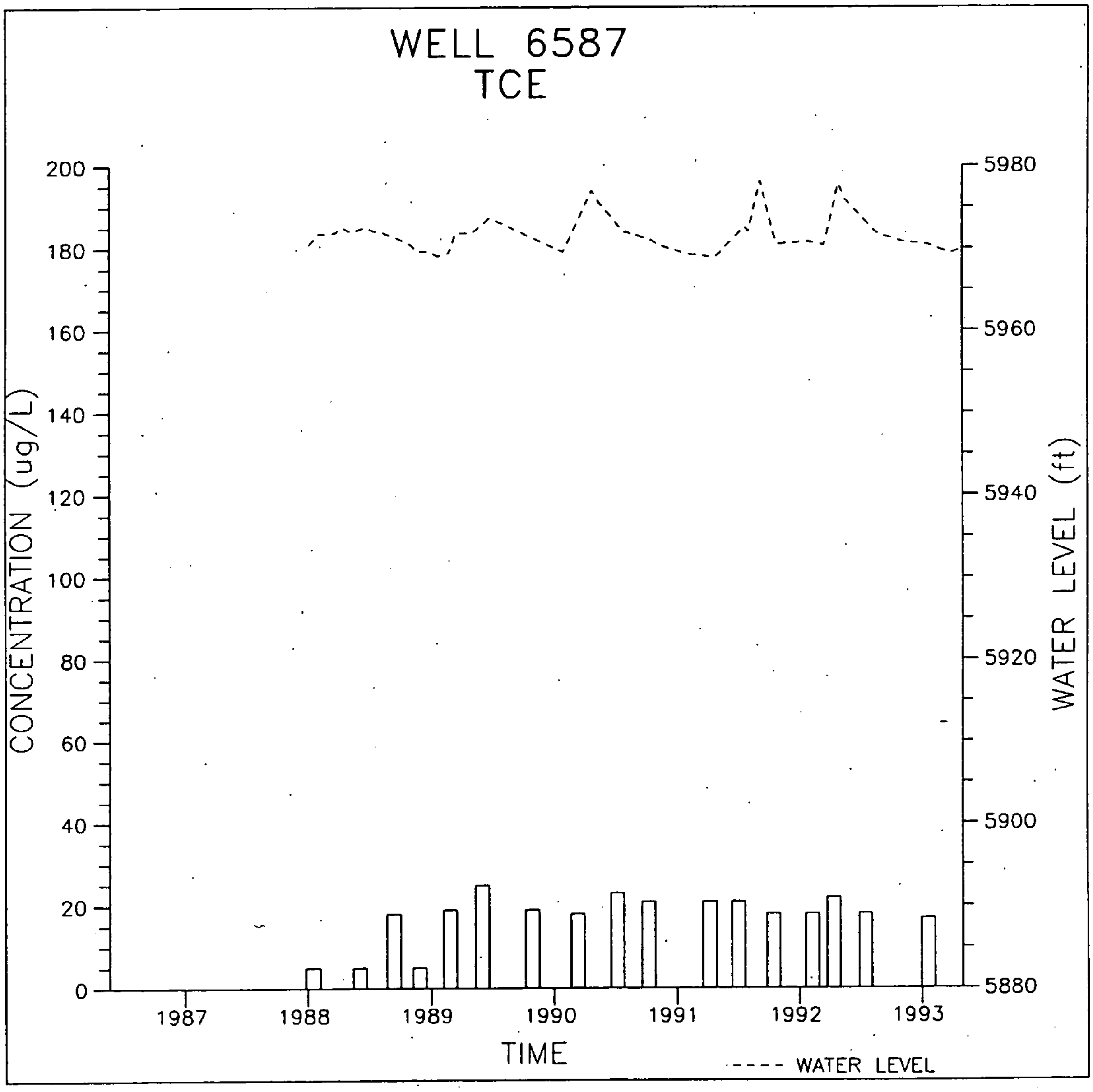

WELL 5587
TCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

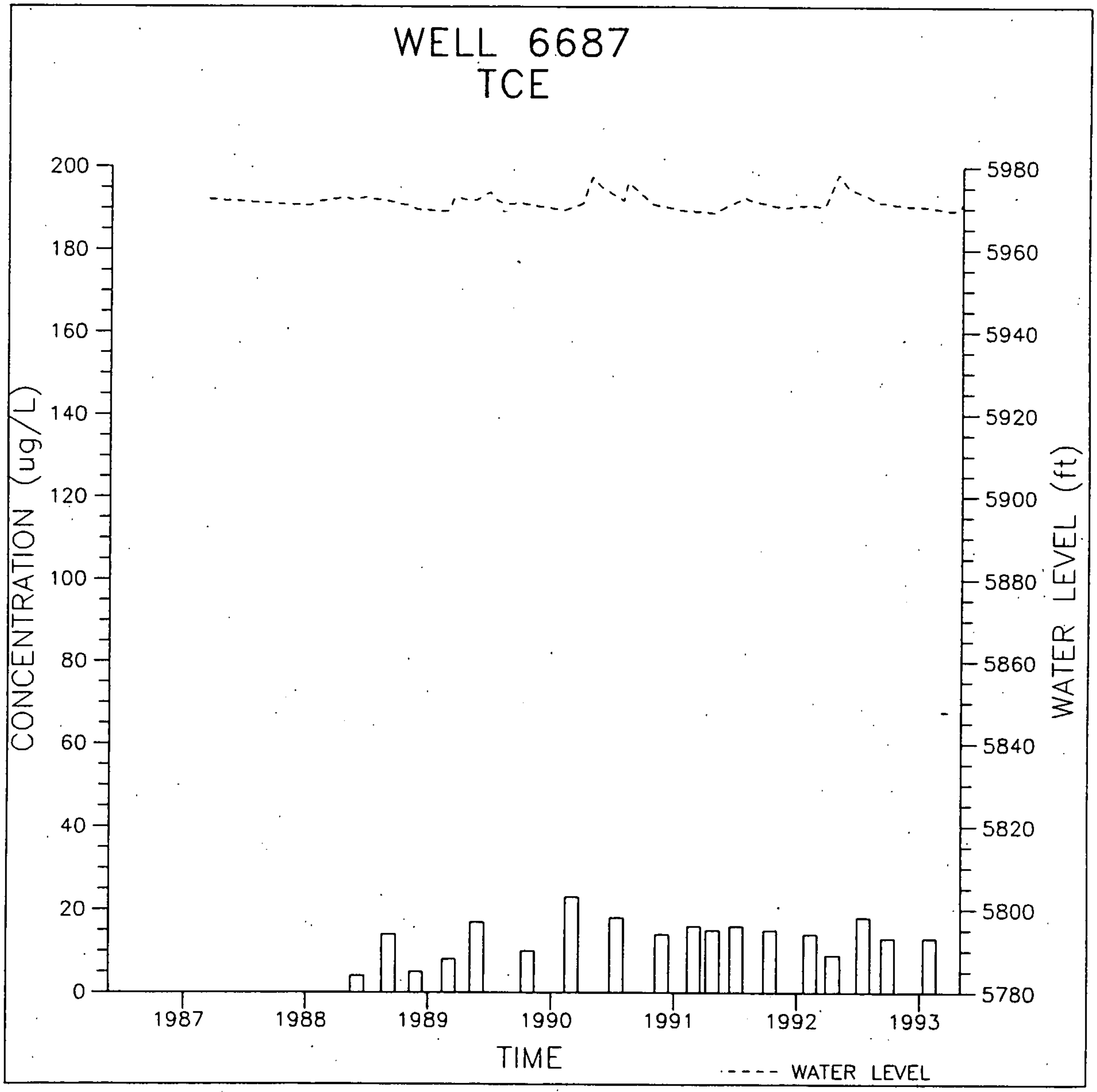
528



WELL 6487
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

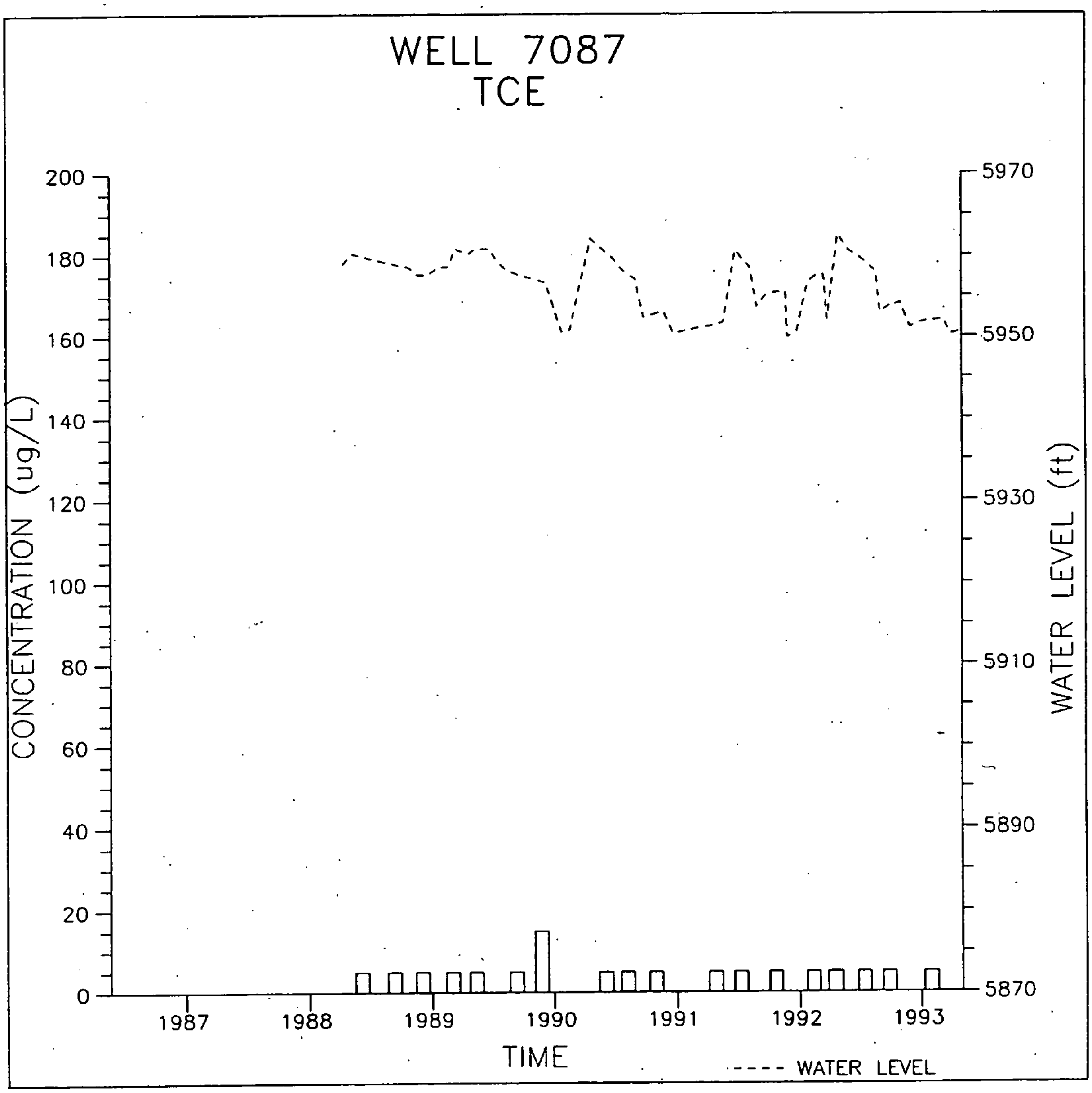
529


WELL 6587
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL



WELL 6687
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993

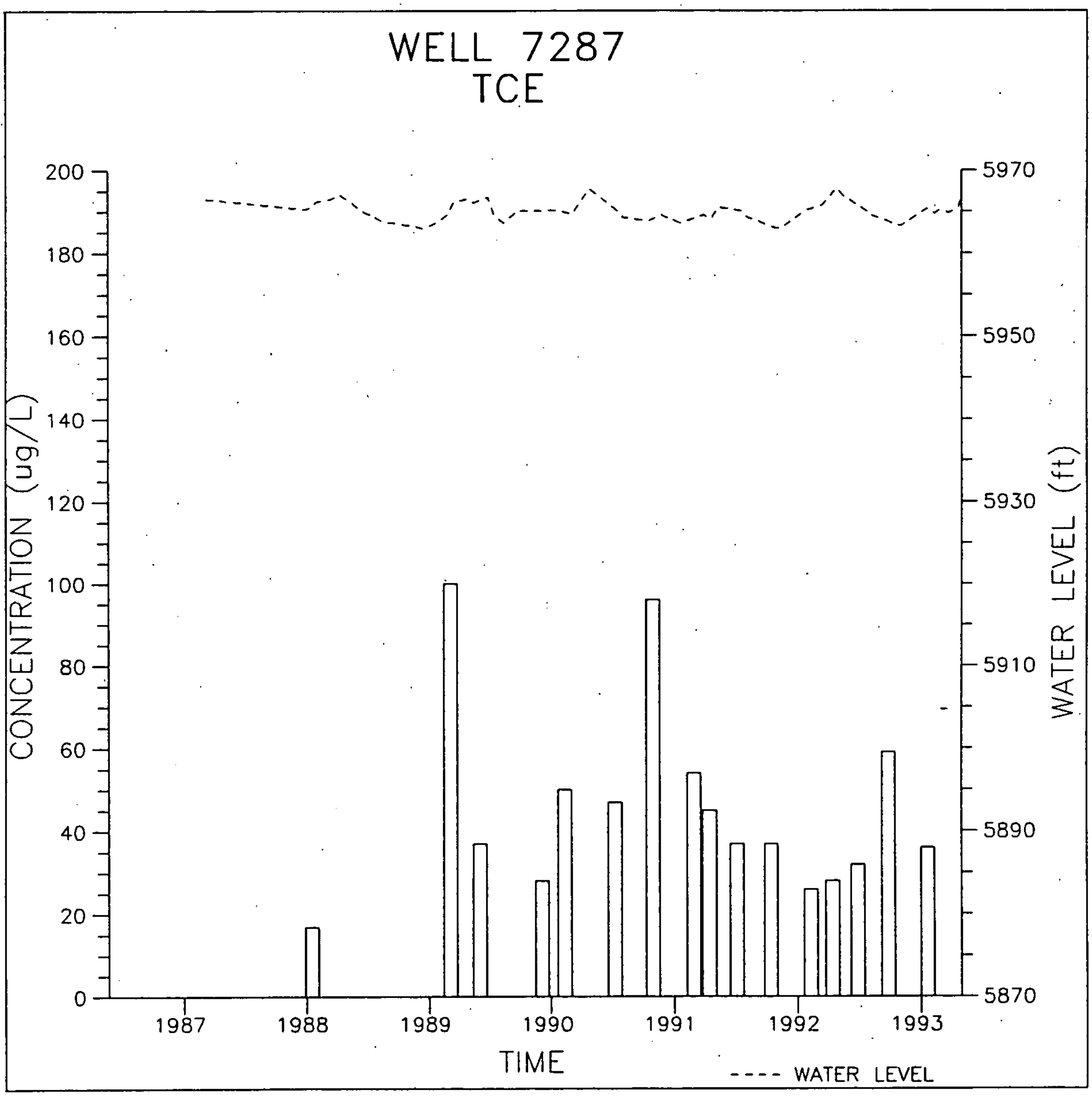
531



WELL 7087
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

532

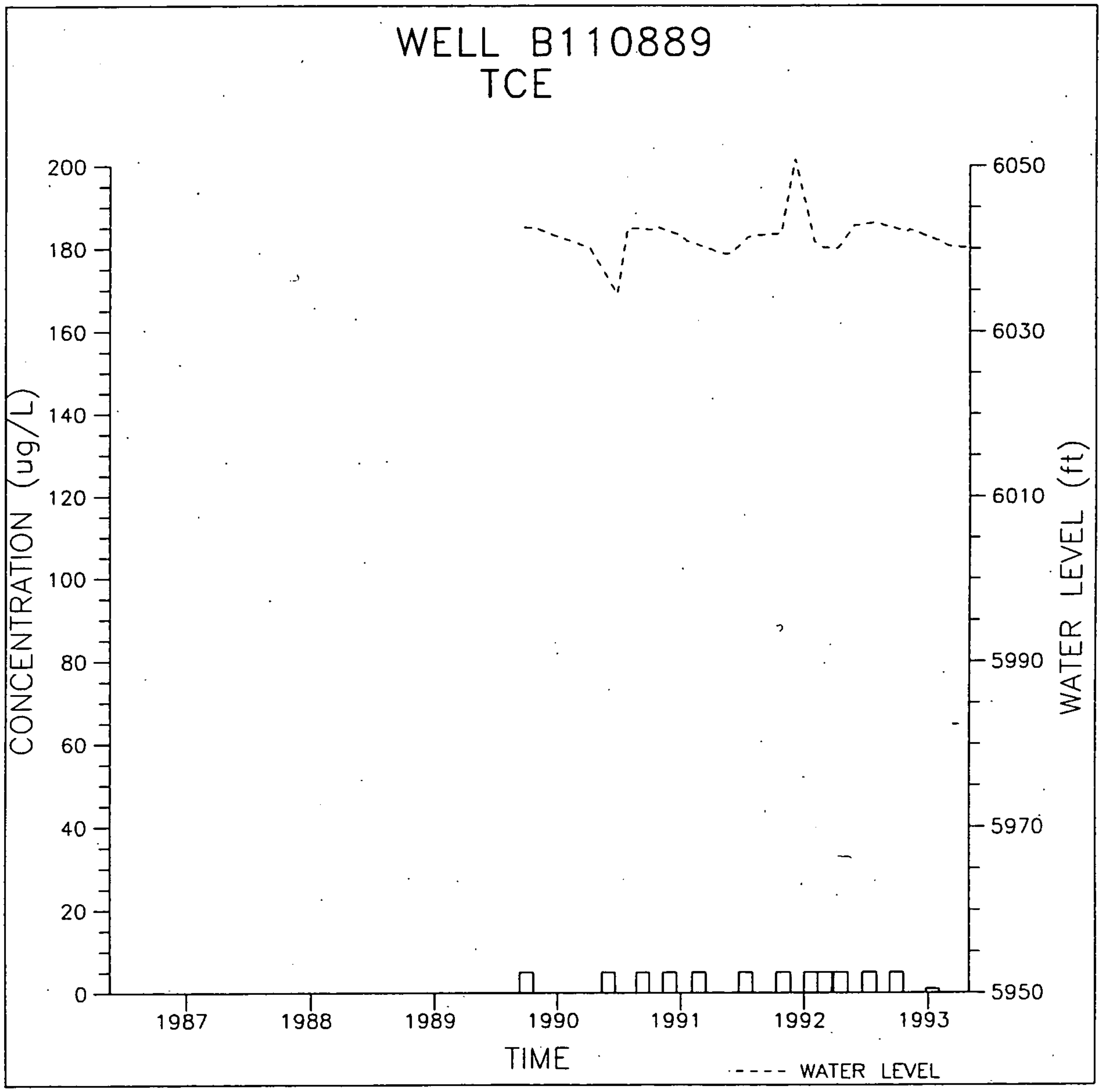
533



WELL 7287
TCE
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

533

534

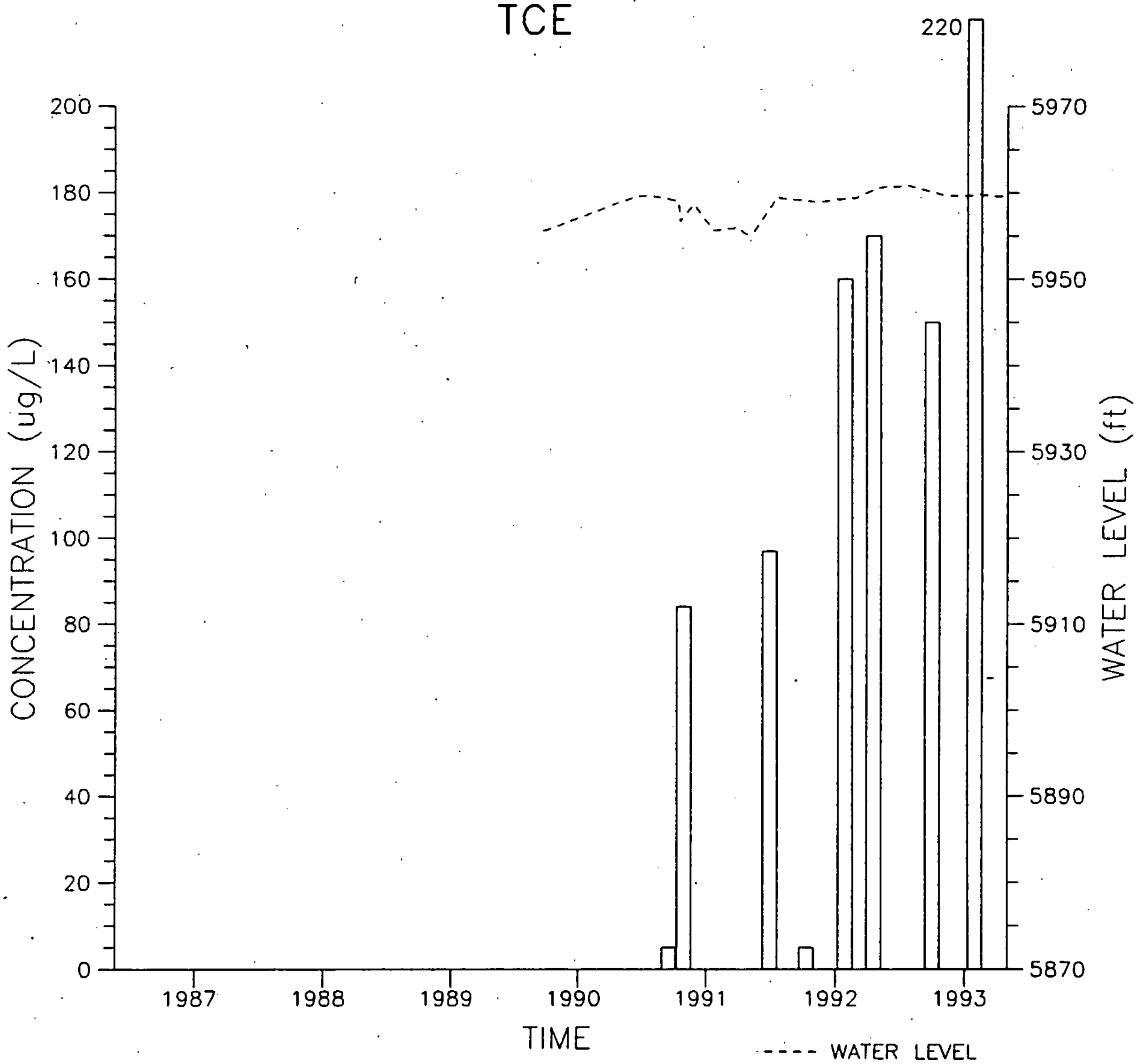


WELL B110889
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

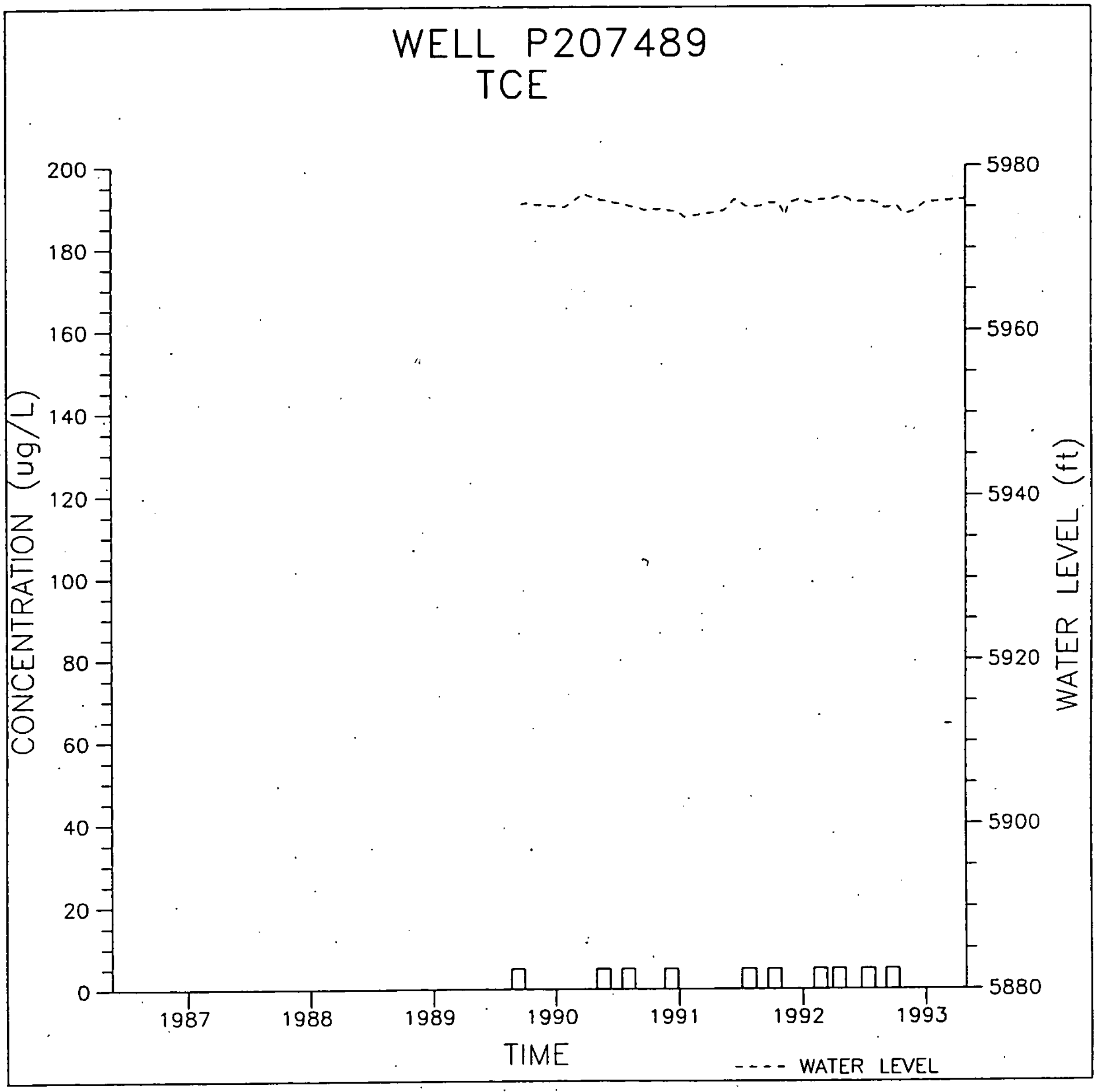
534

~~535~~

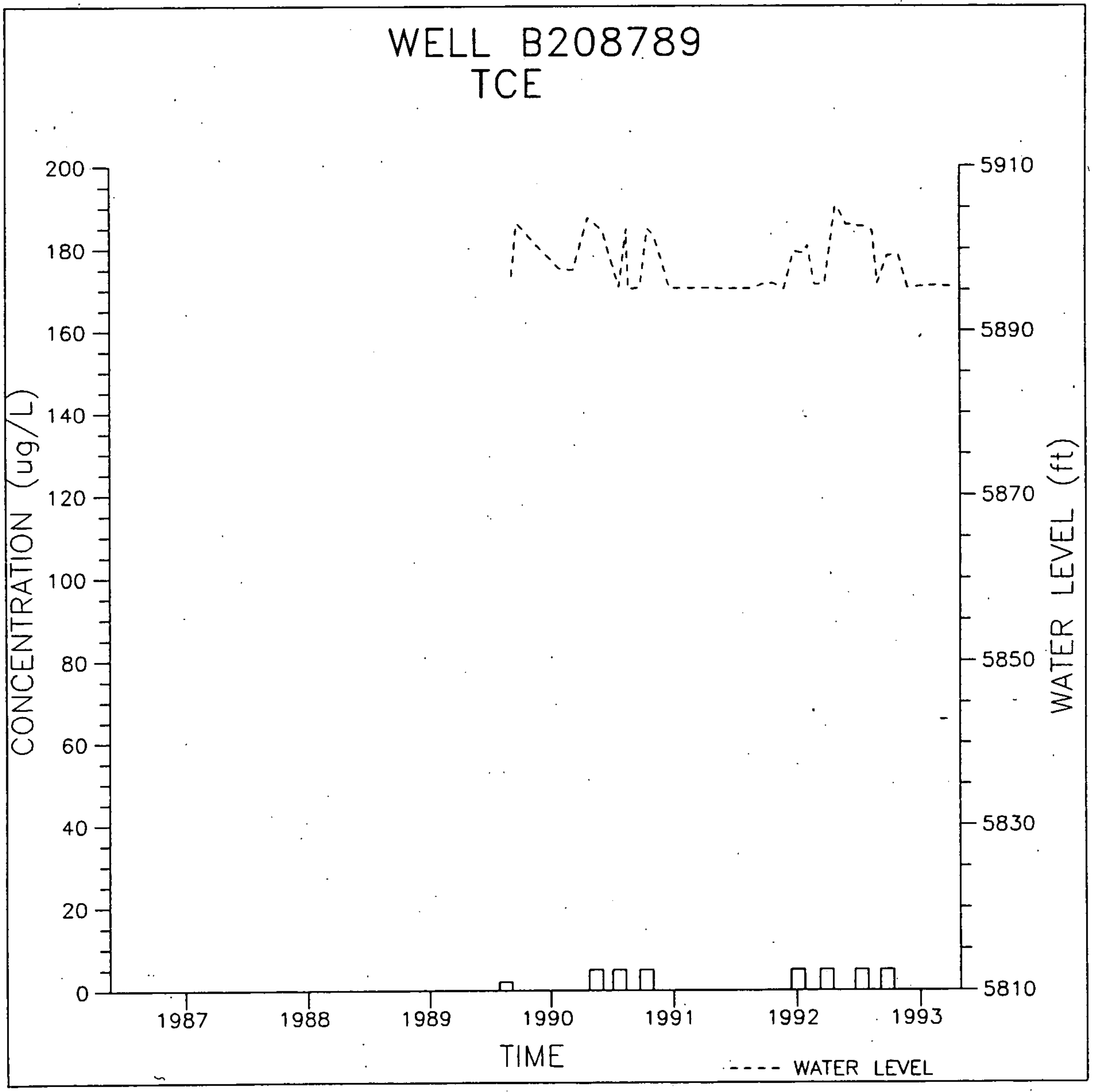
WELL B206389
TCE



535

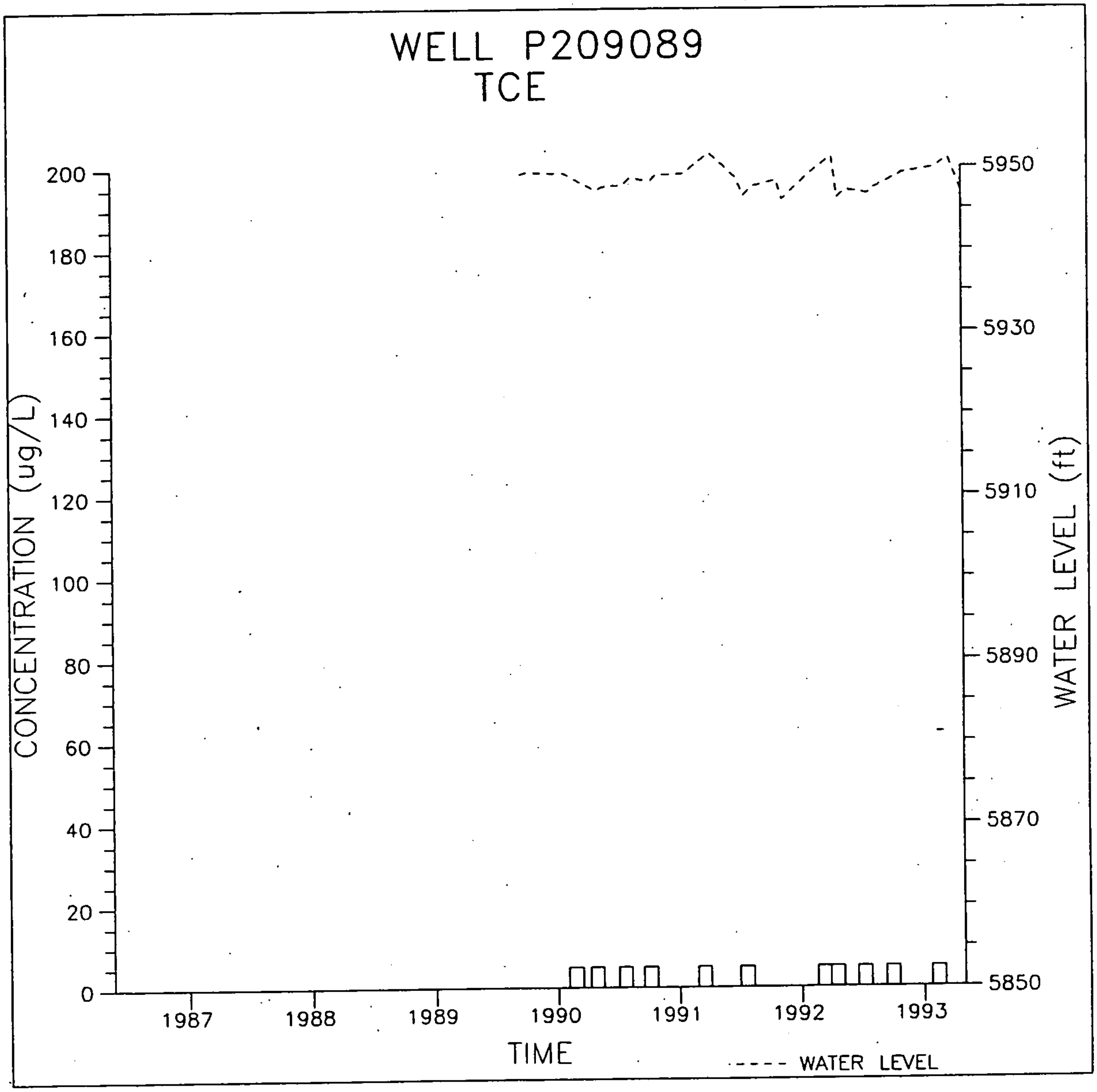


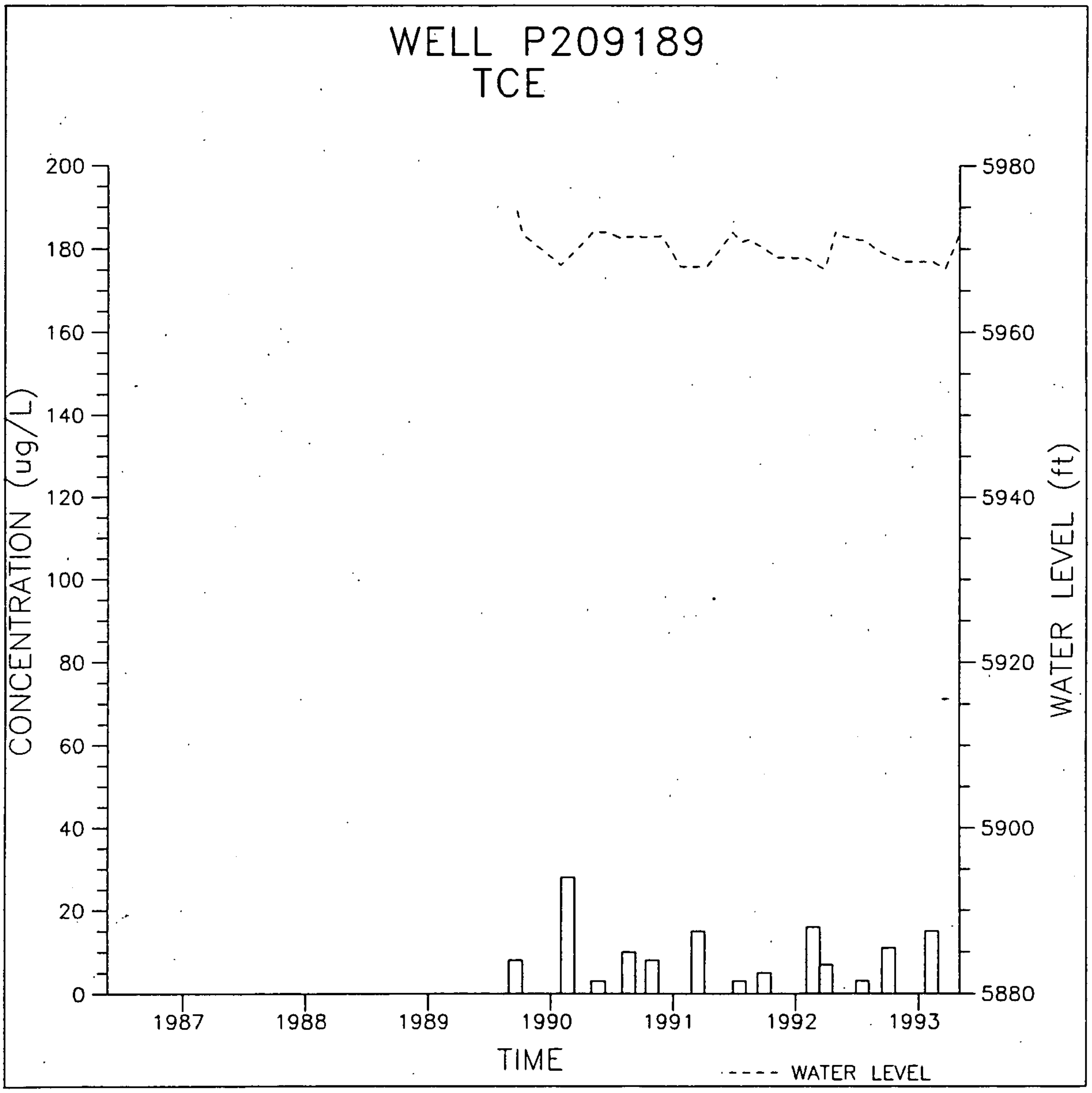
WELL P207489
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL


WELL B208789
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

537

538

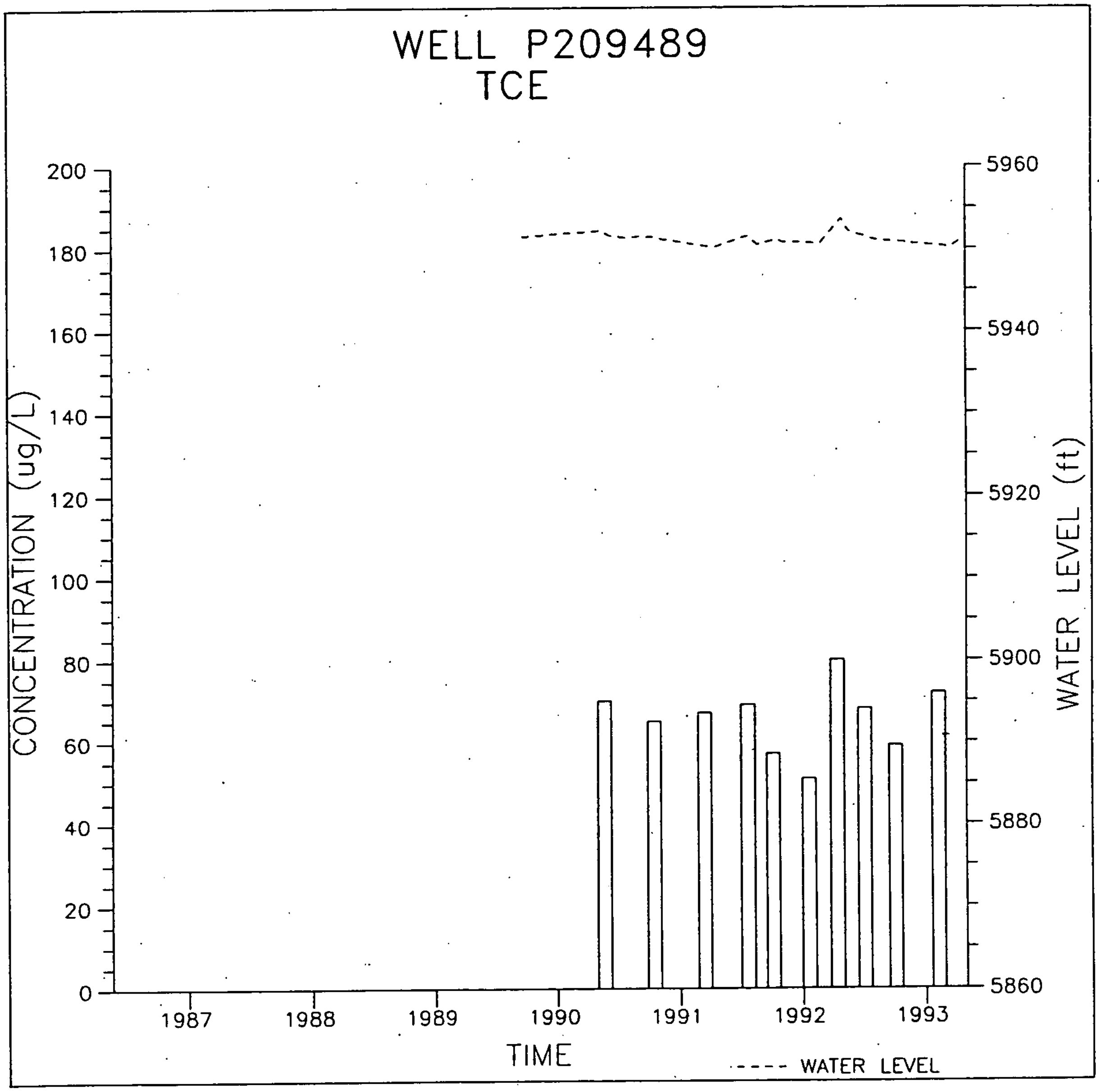

WELL P209089
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL P209189
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

539

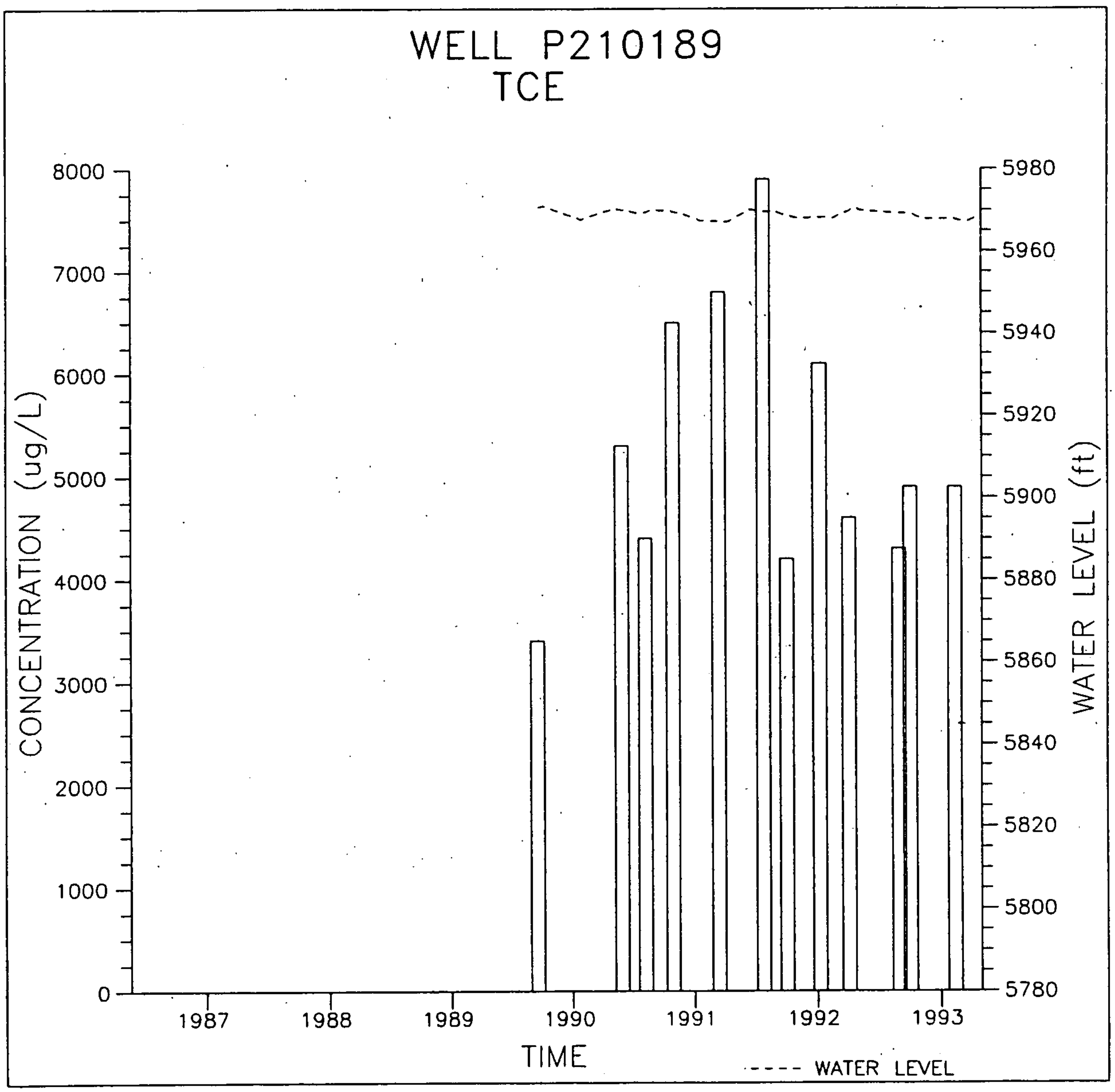
540



WELL P209489
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

540

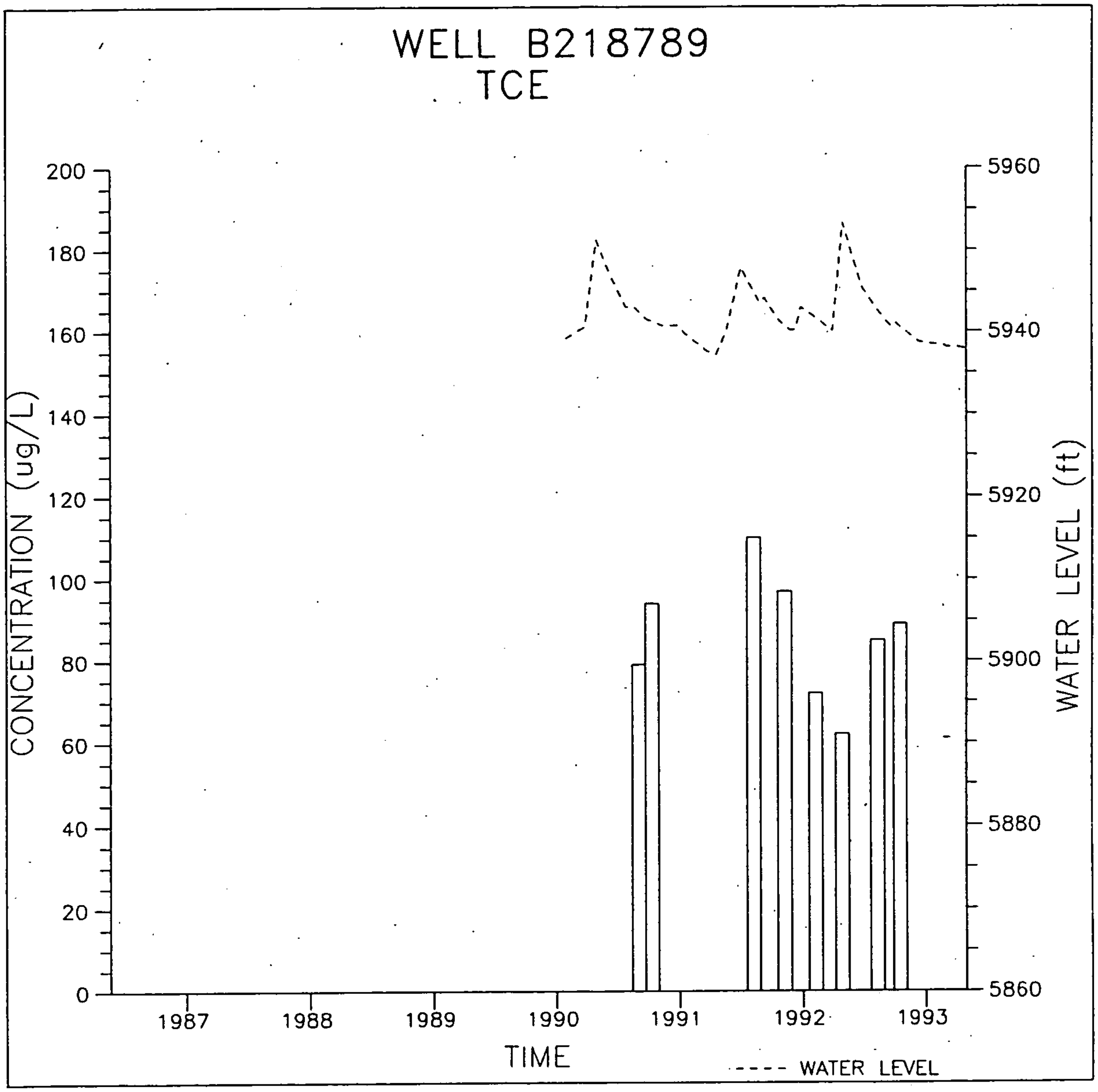
541



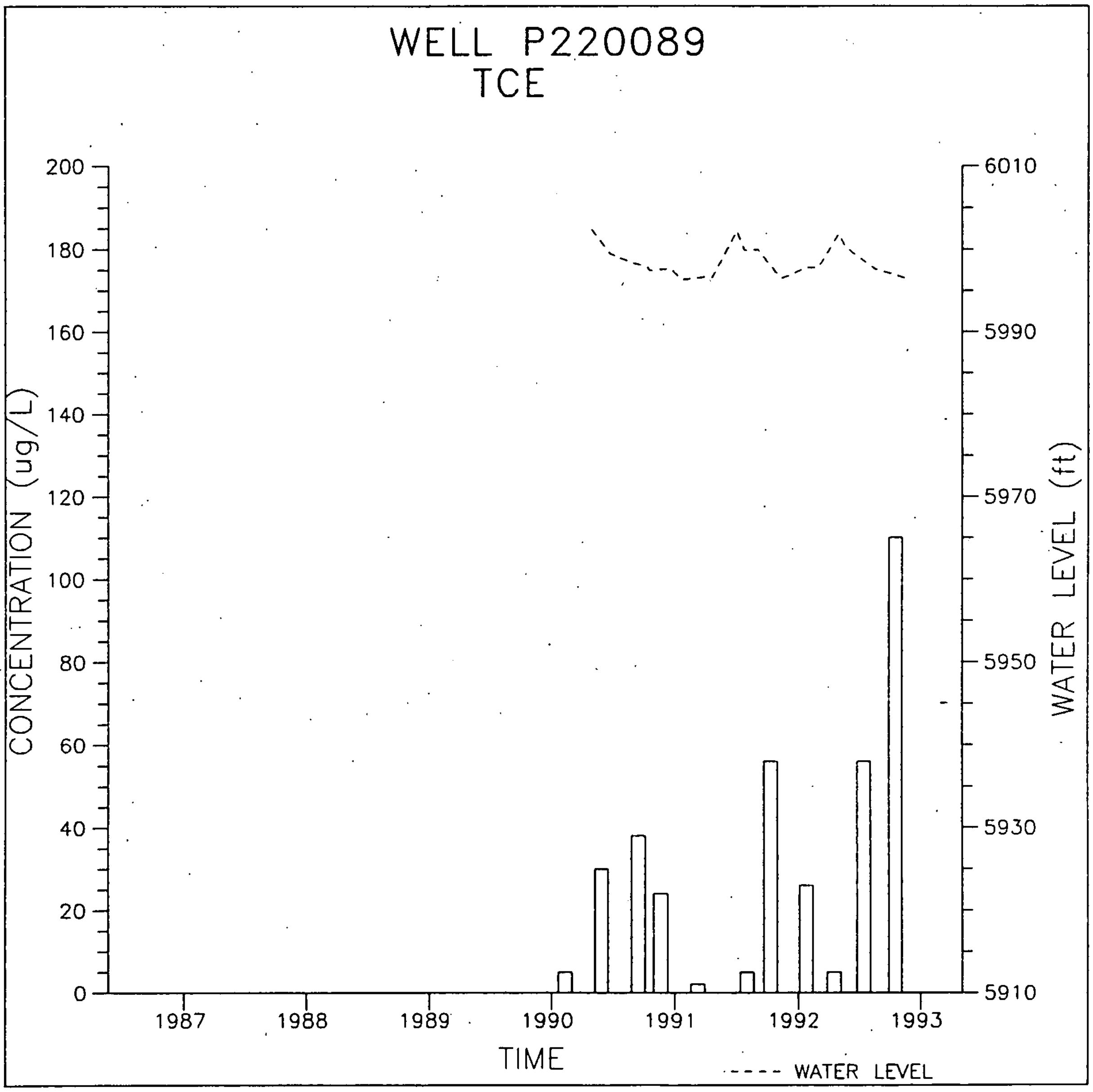
WELL P210189
TCE
CONCENTRATION (ug/L)
0
1000
2000
3000
4000
5000
6000
7000
8000
WATER LEVEL (ft)
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

542

541



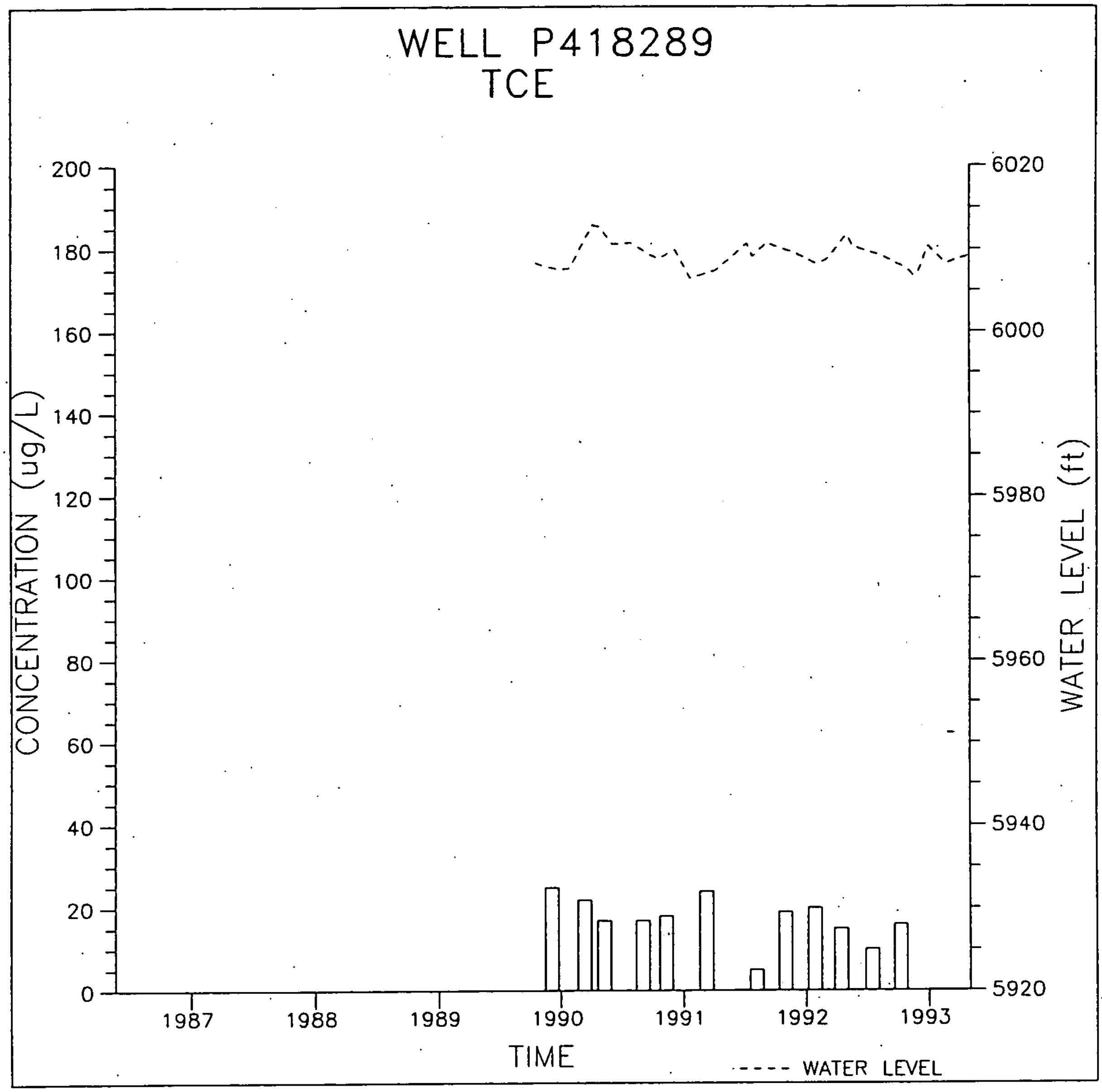
WELL B218789
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

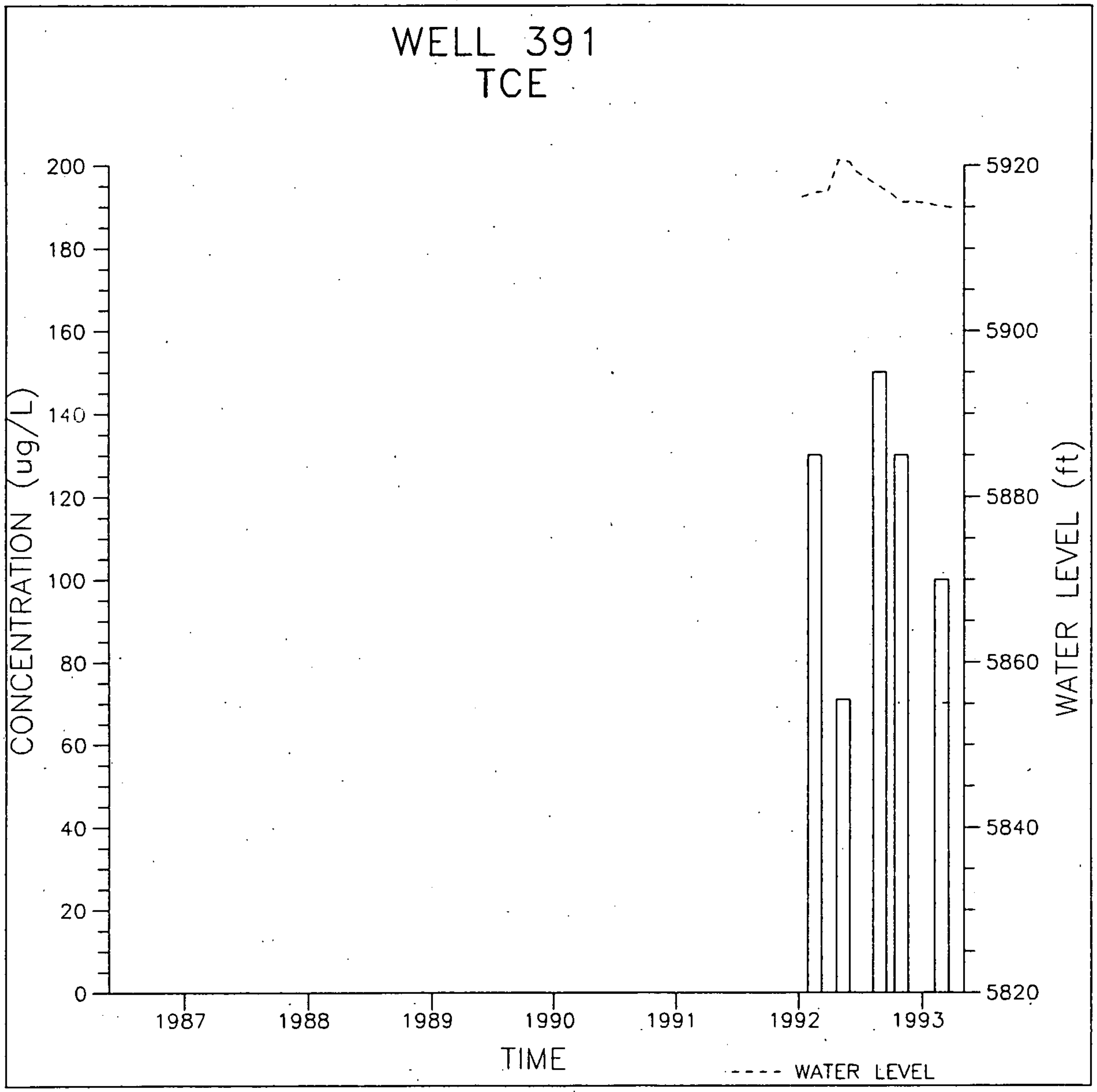


WELL P220089
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6010
5990
5970
5950
5930
5910
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

544

543

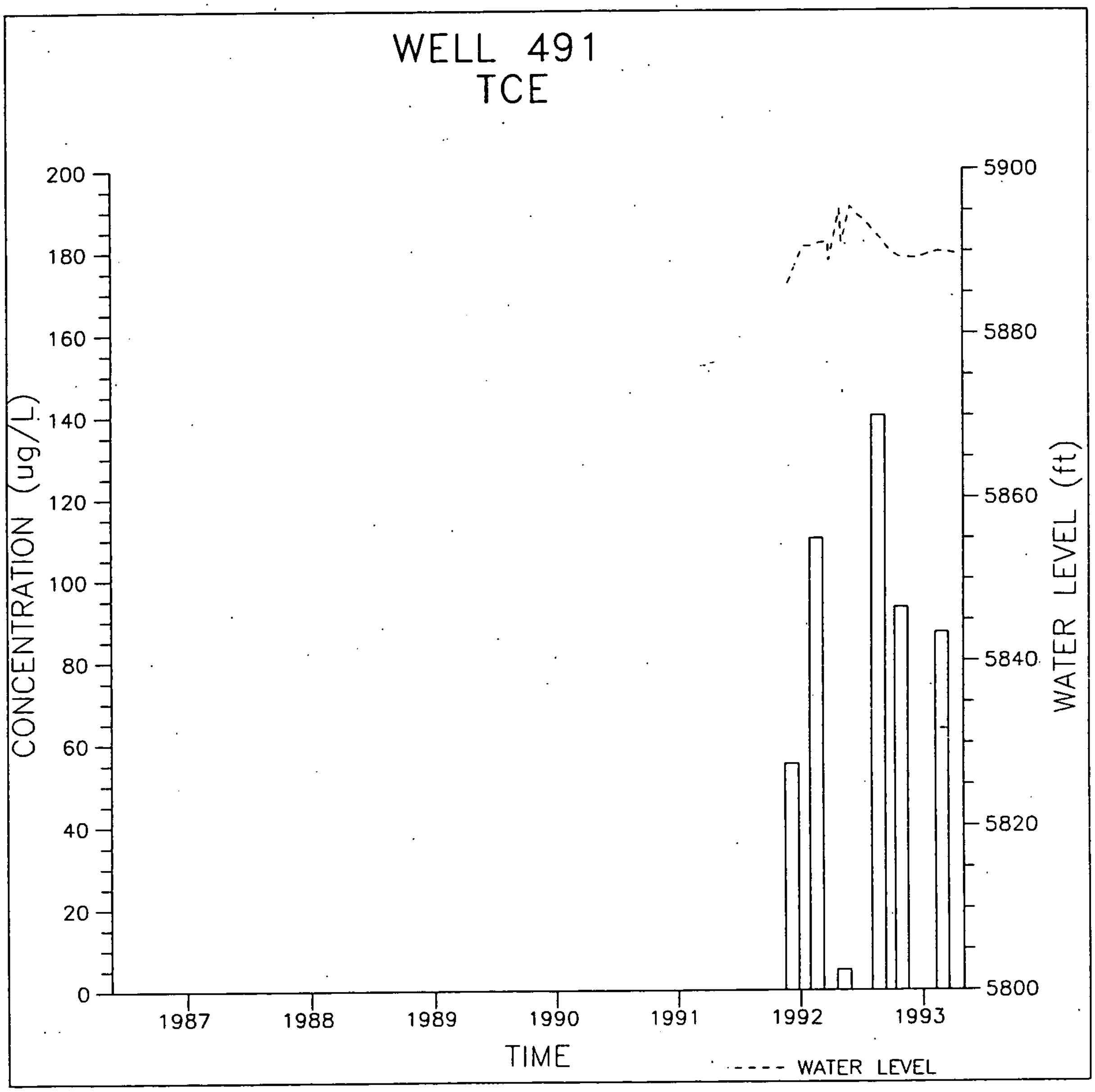

WELL P418289
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL 391
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

546

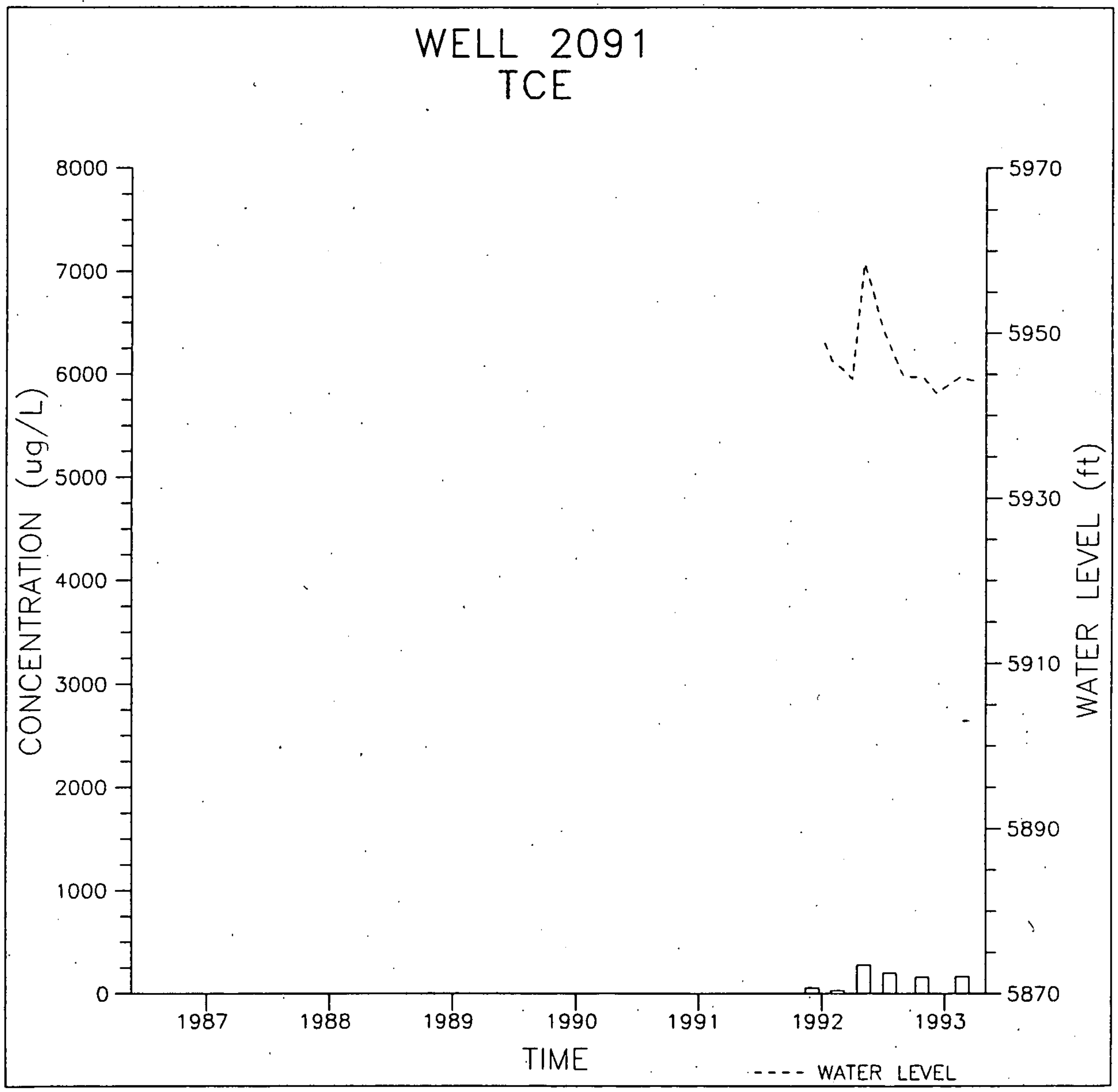
545



WELL 491
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

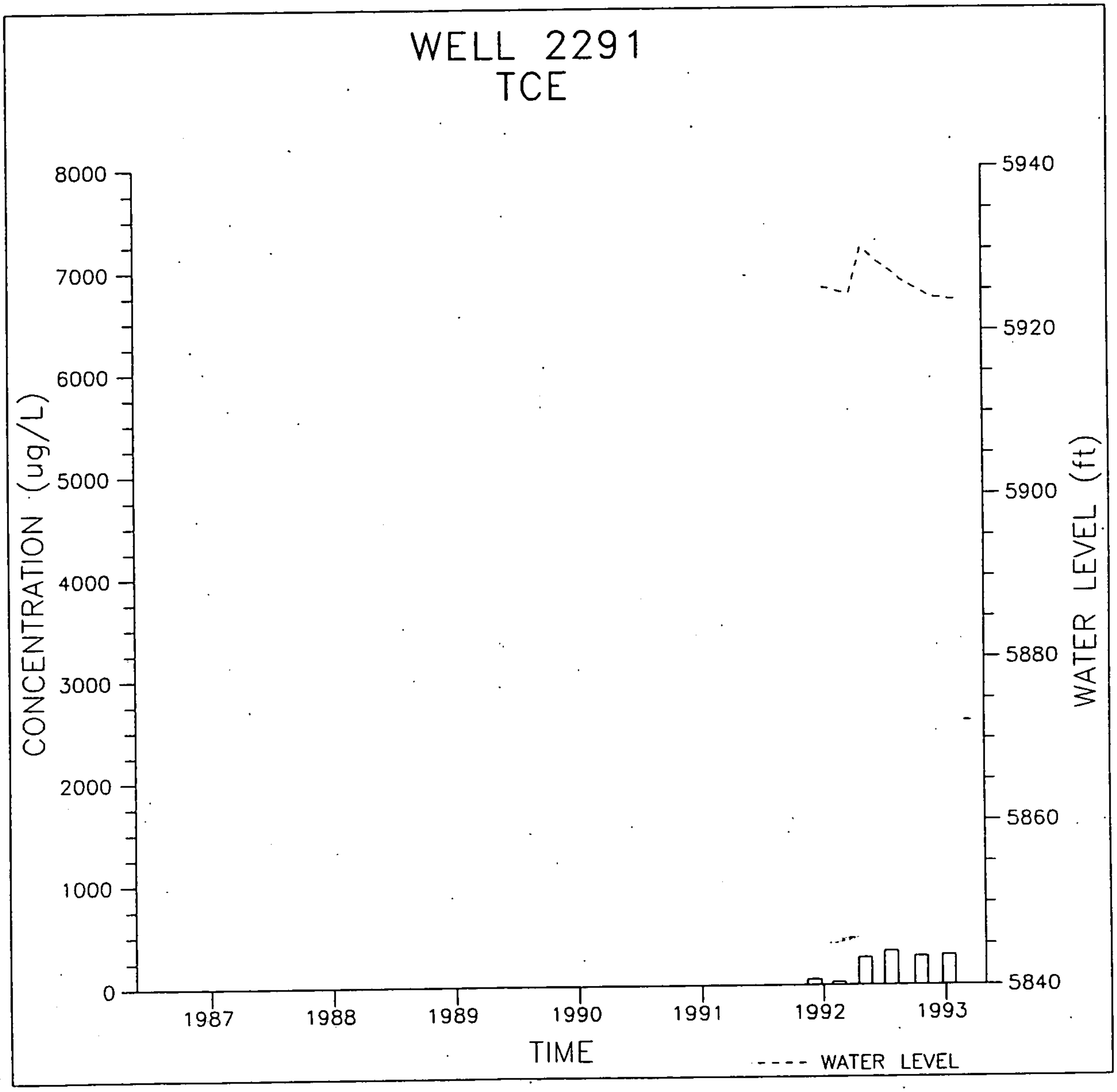
546

547



WELL 2091
TCE
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

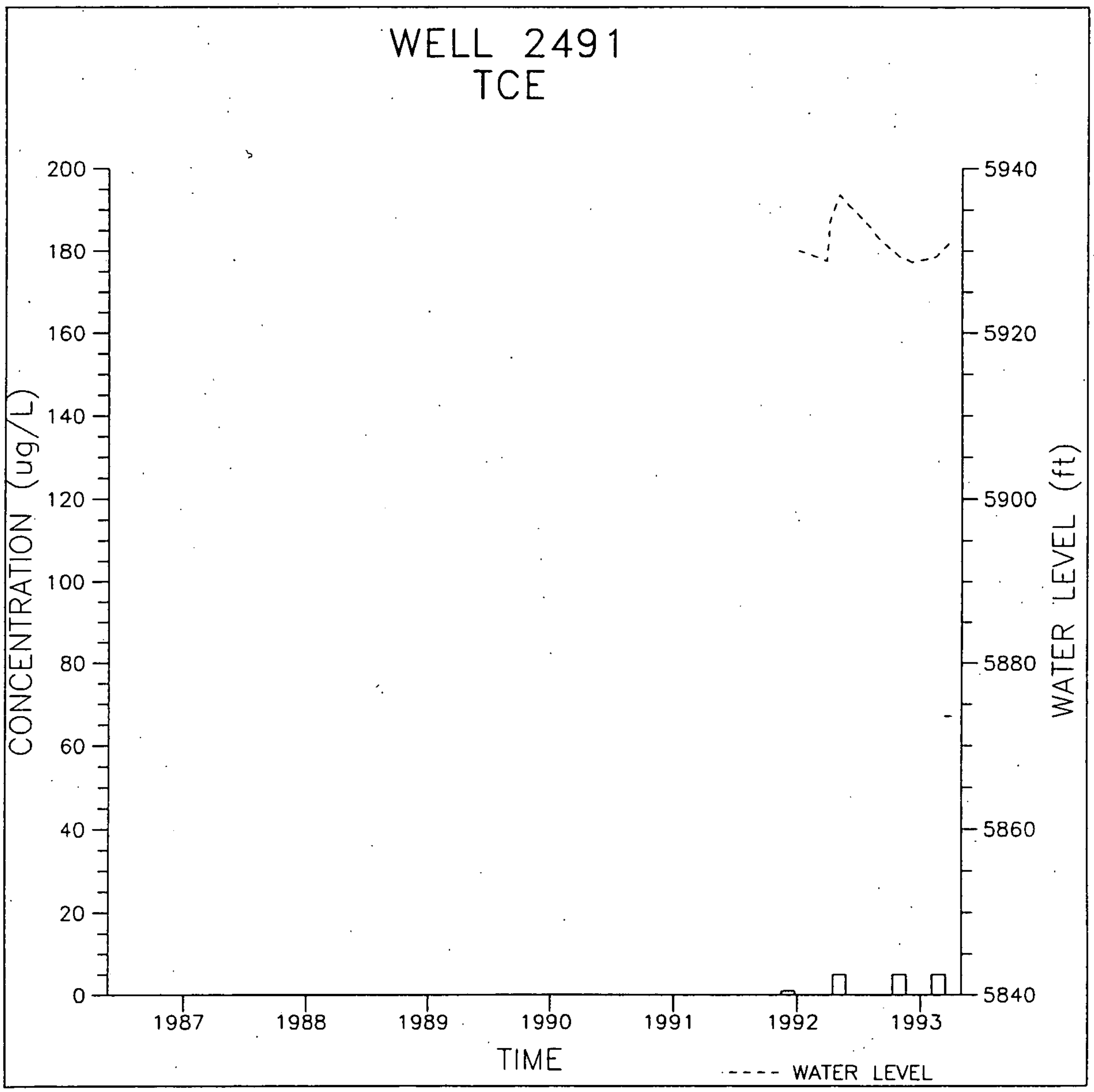
547



WELL 2291
TCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

548

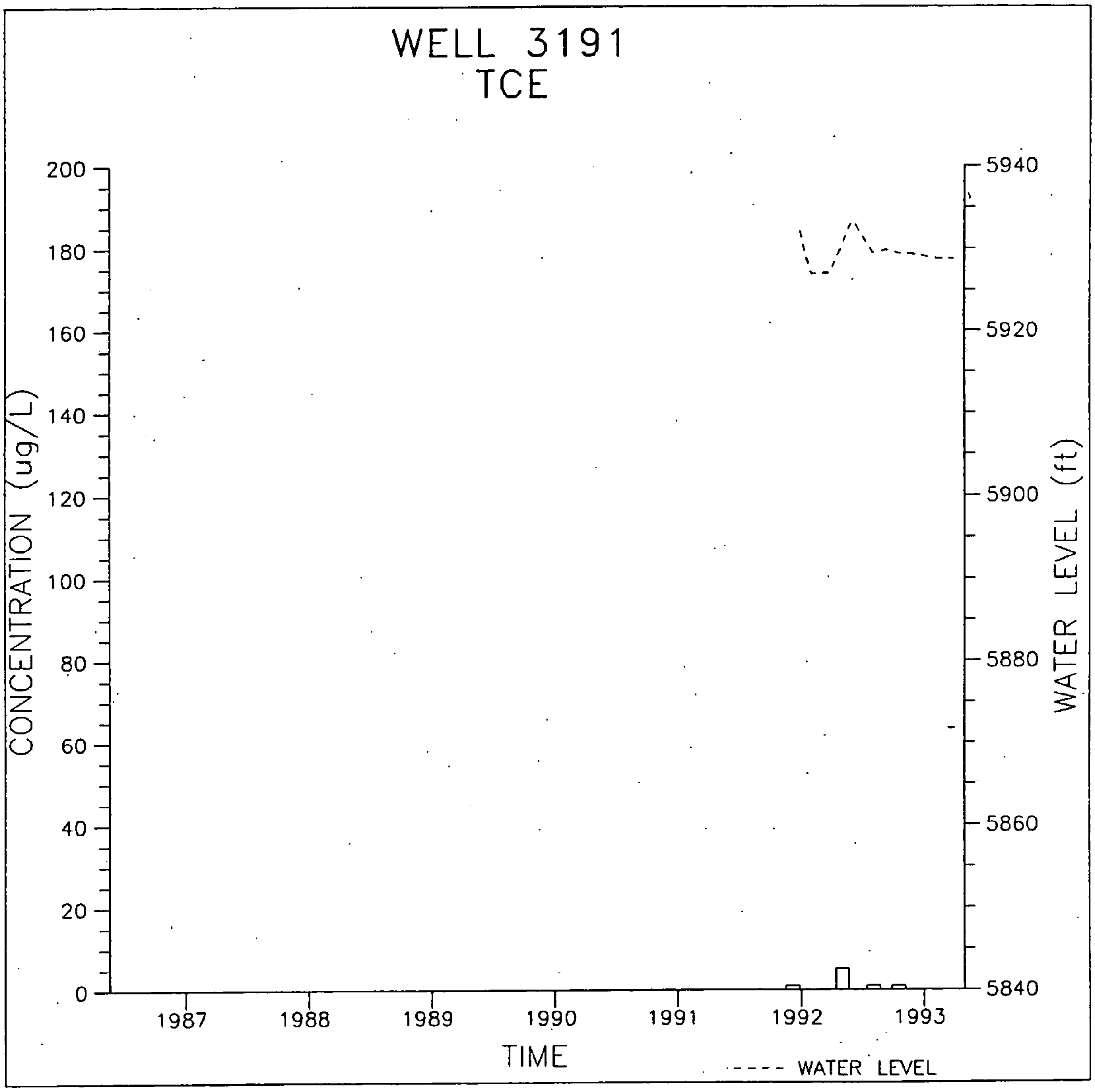
549



WELL 2491
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

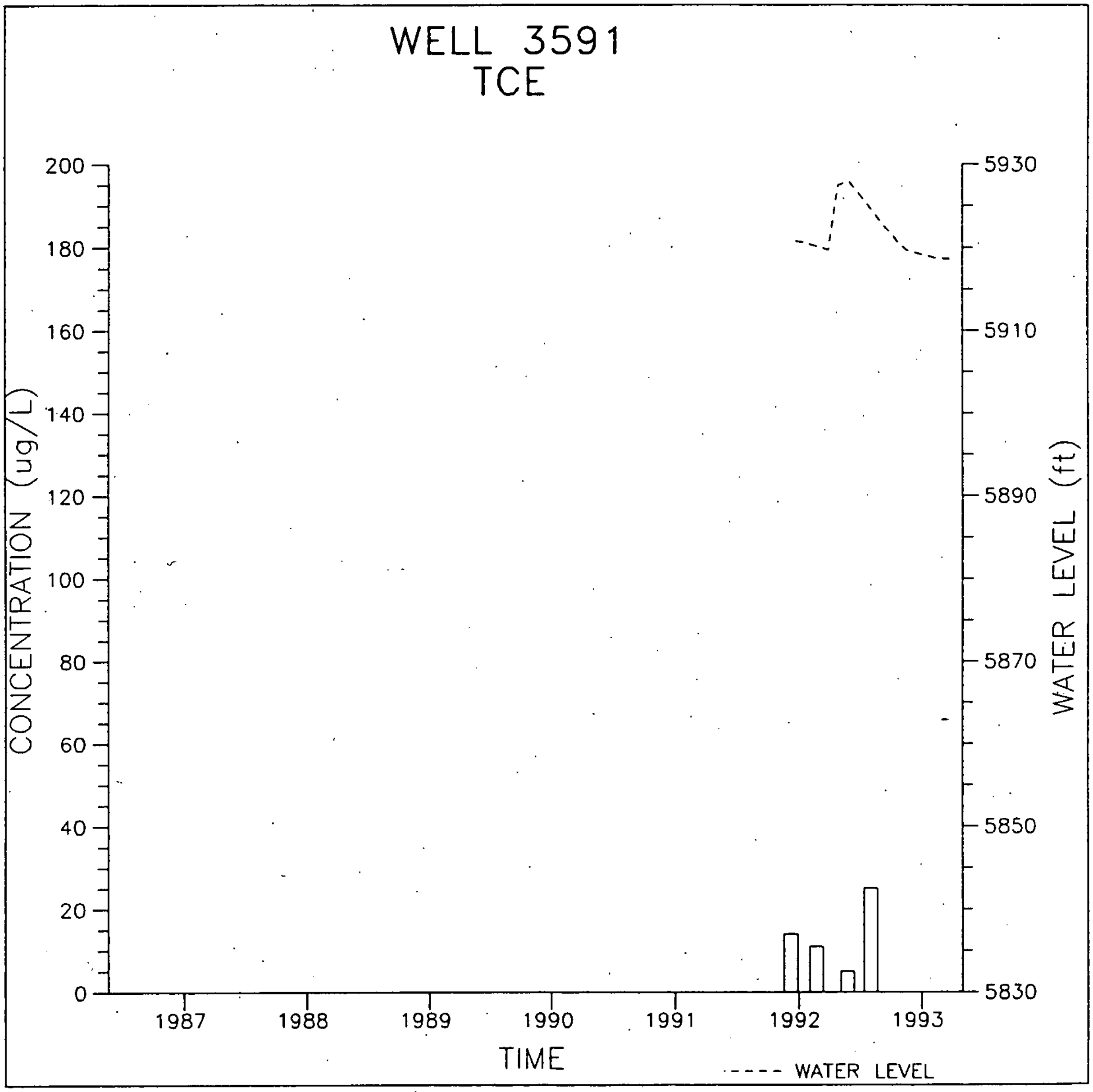
550

549

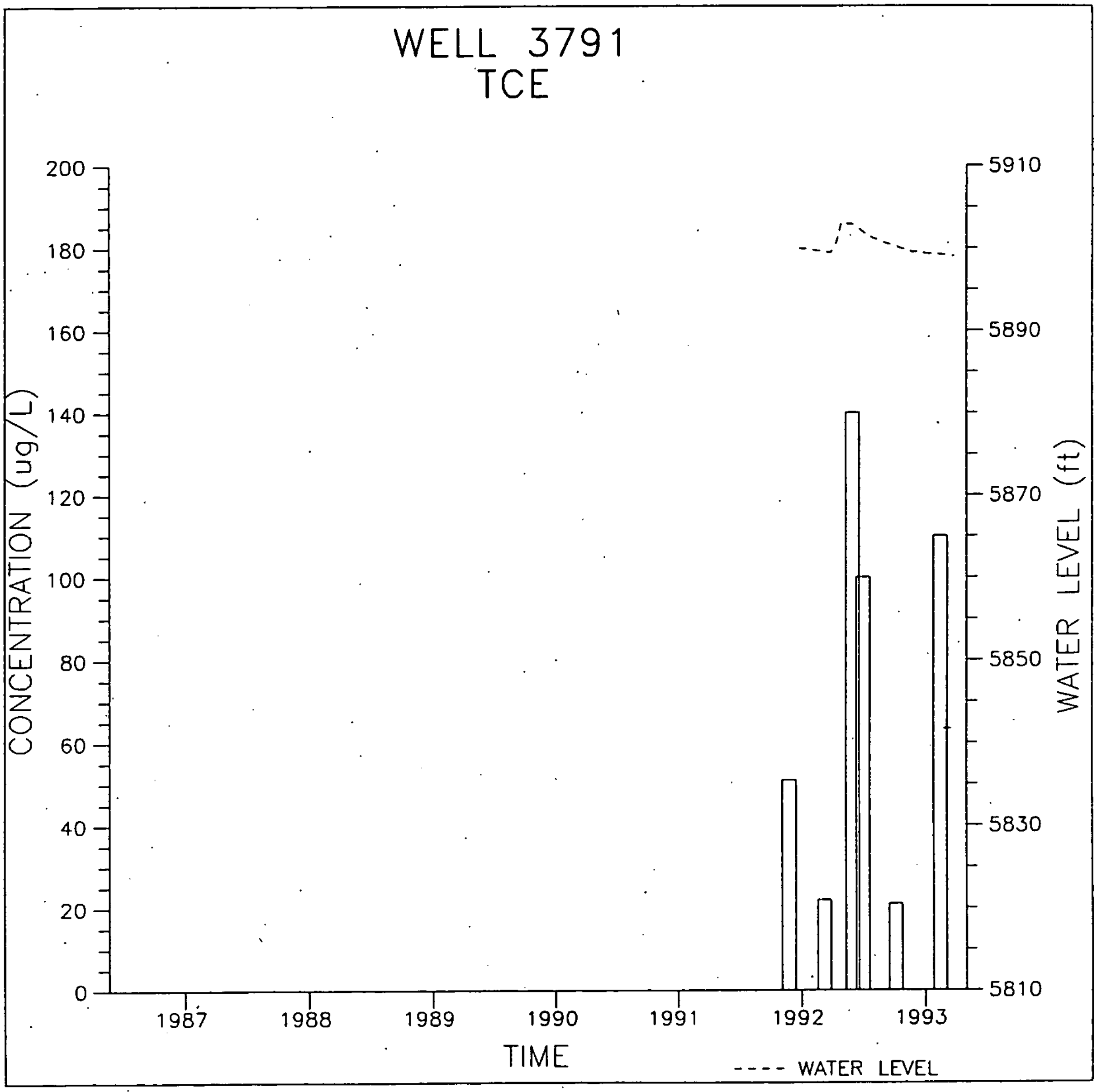

WELL 3191
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

550

554


WELL 3591
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
WATER LEVEL

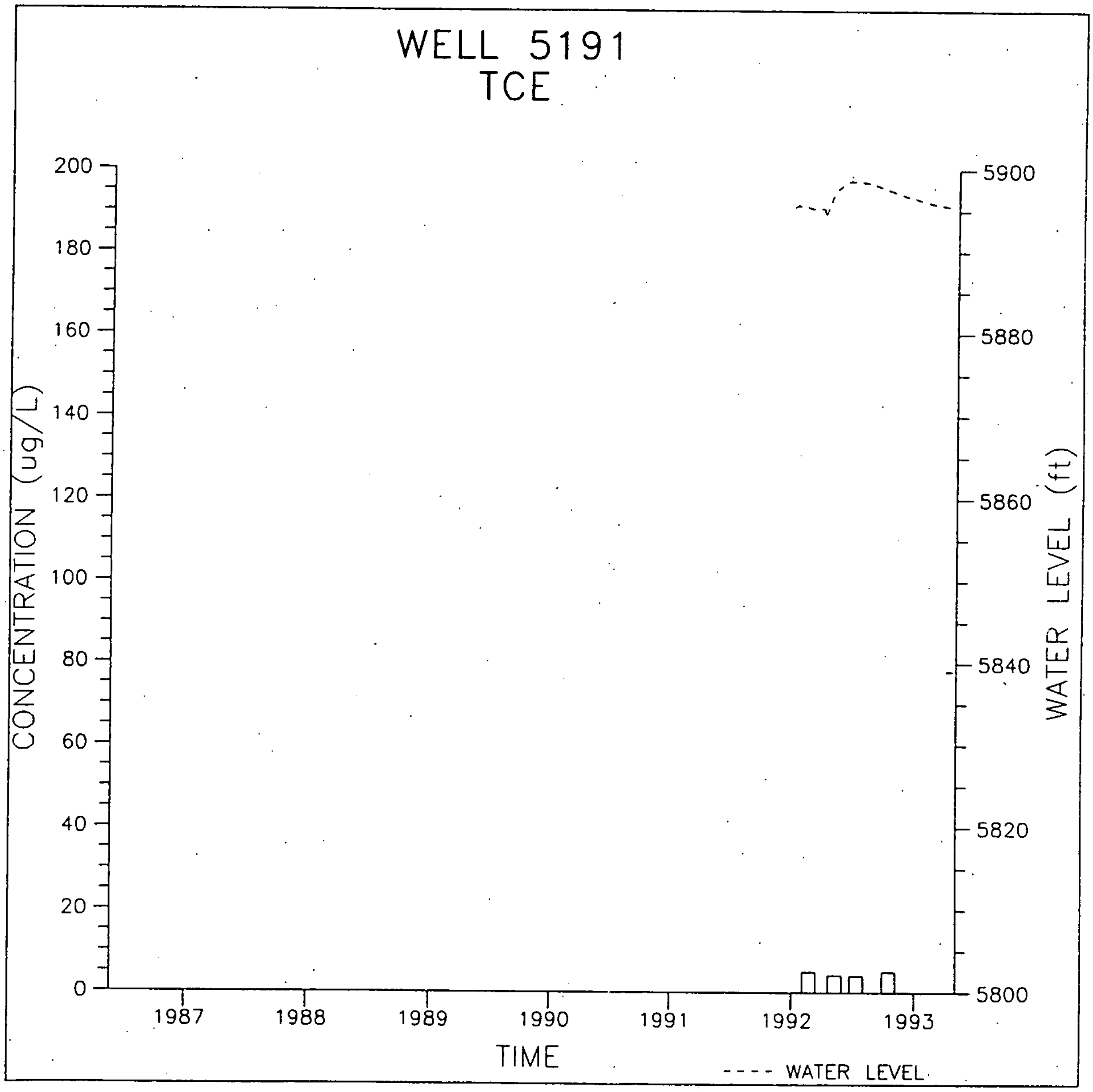
551



WELL 3791
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

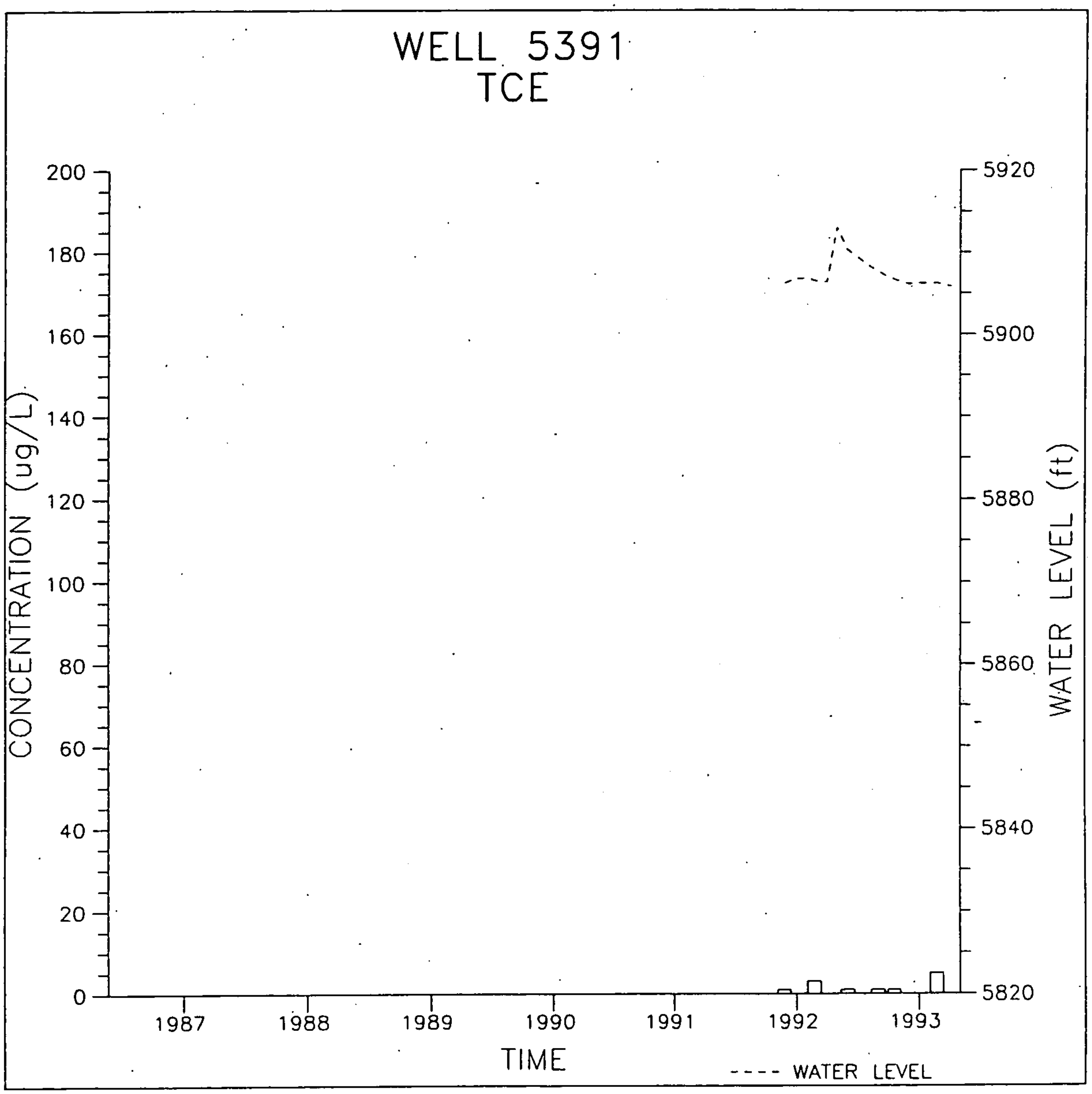
552

553

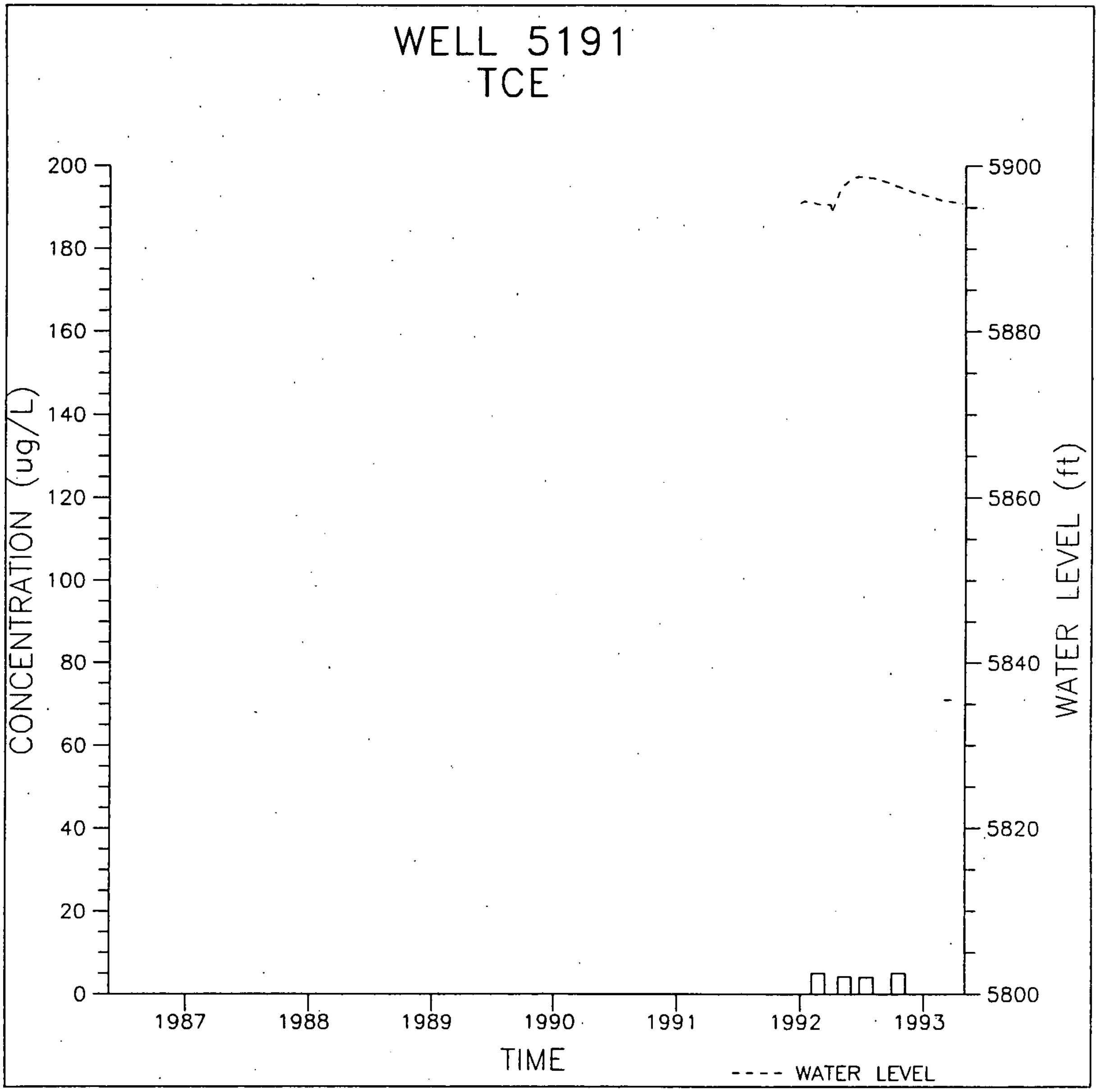


WELL 5191
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

553

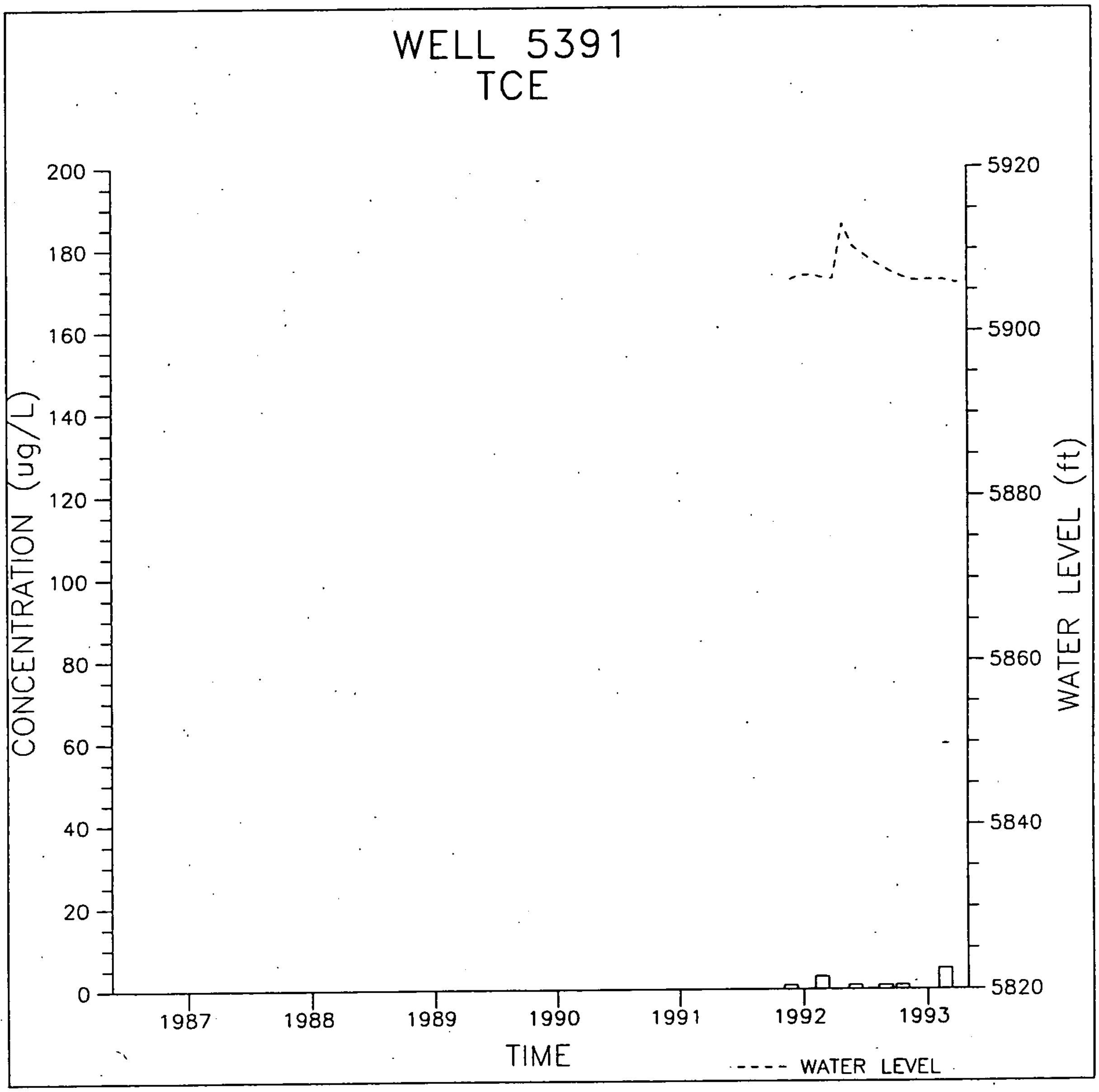


WELL 5391
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



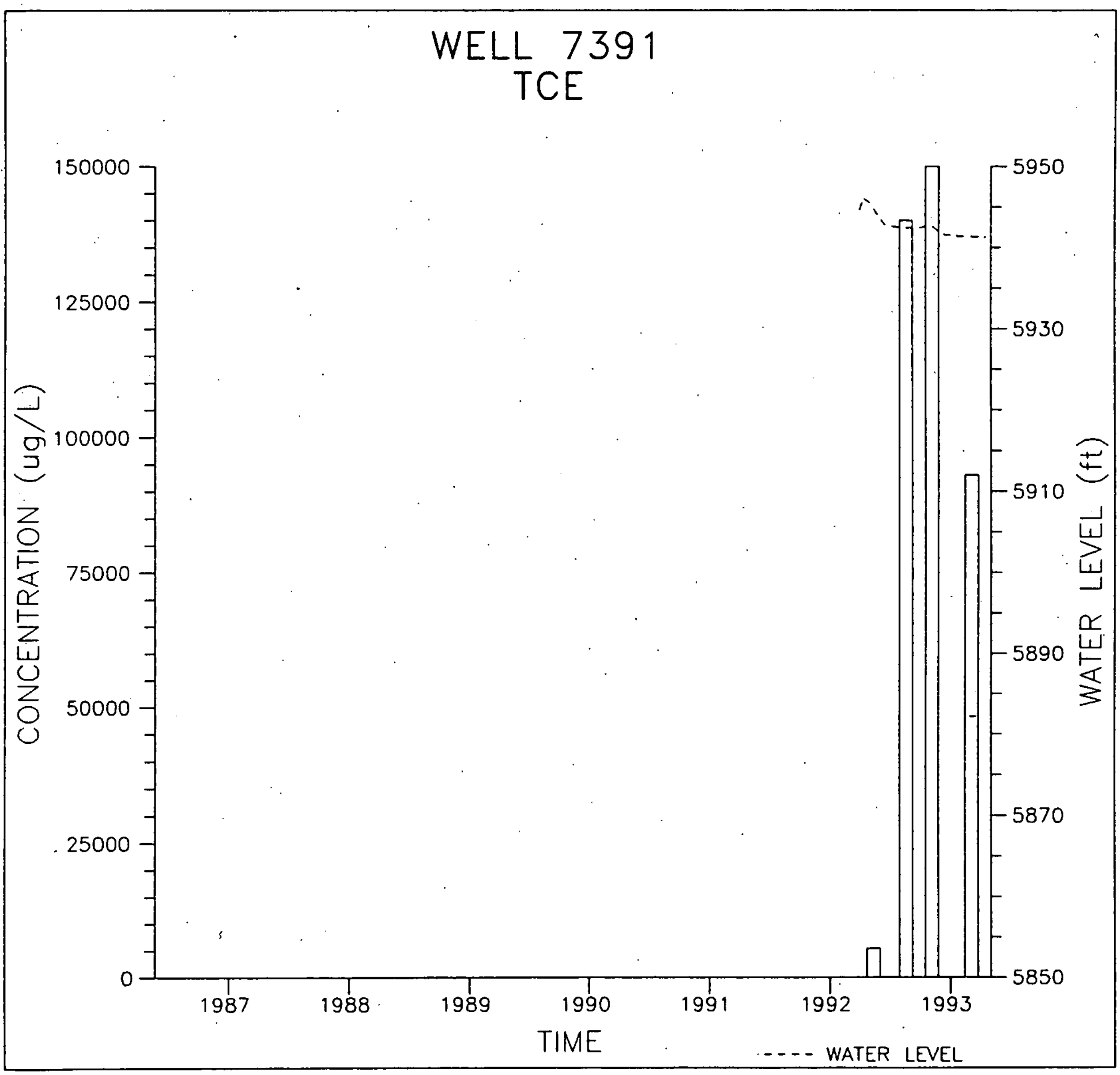
WELL 5191
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

555


WELL 5391
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

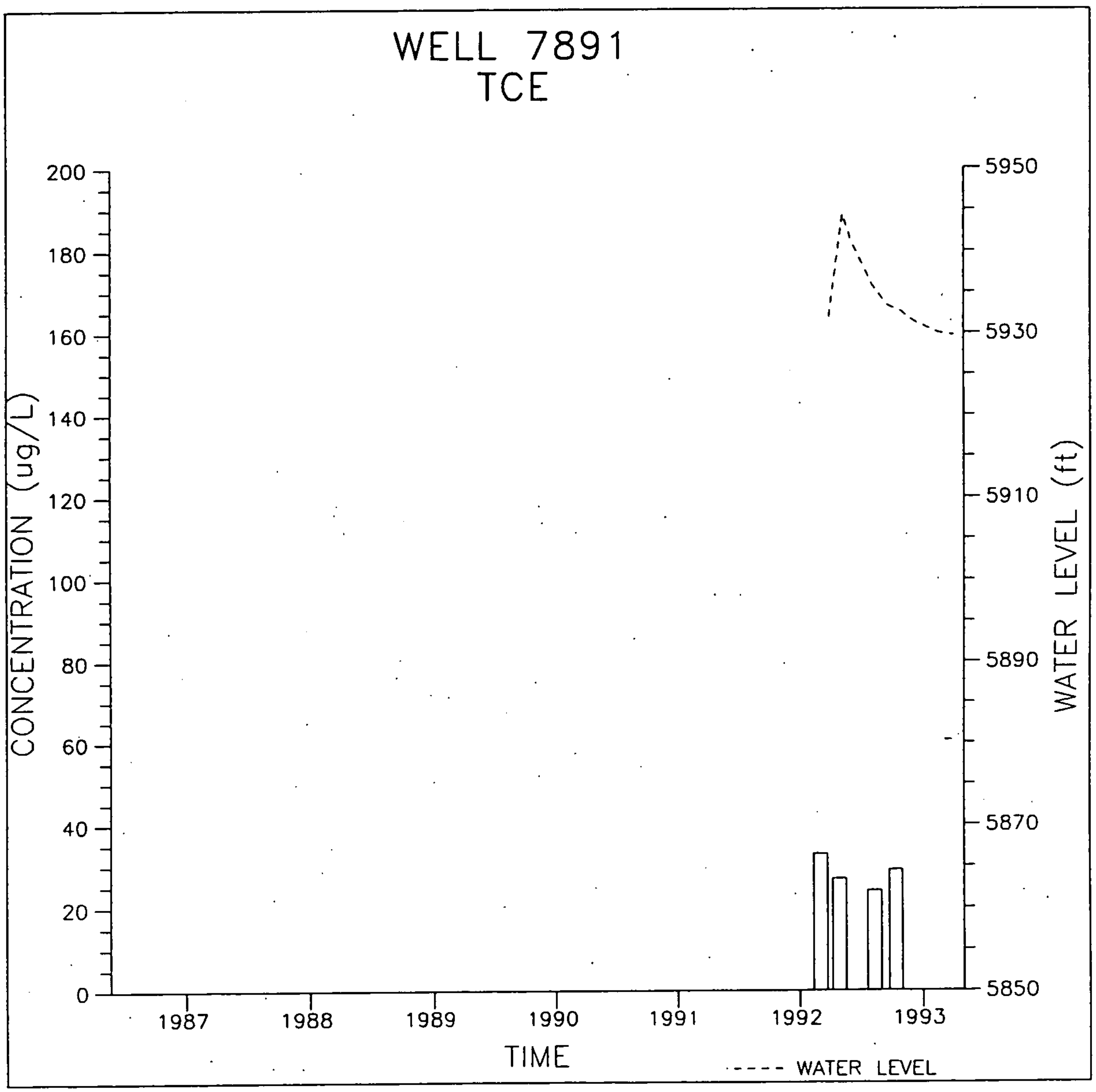
556

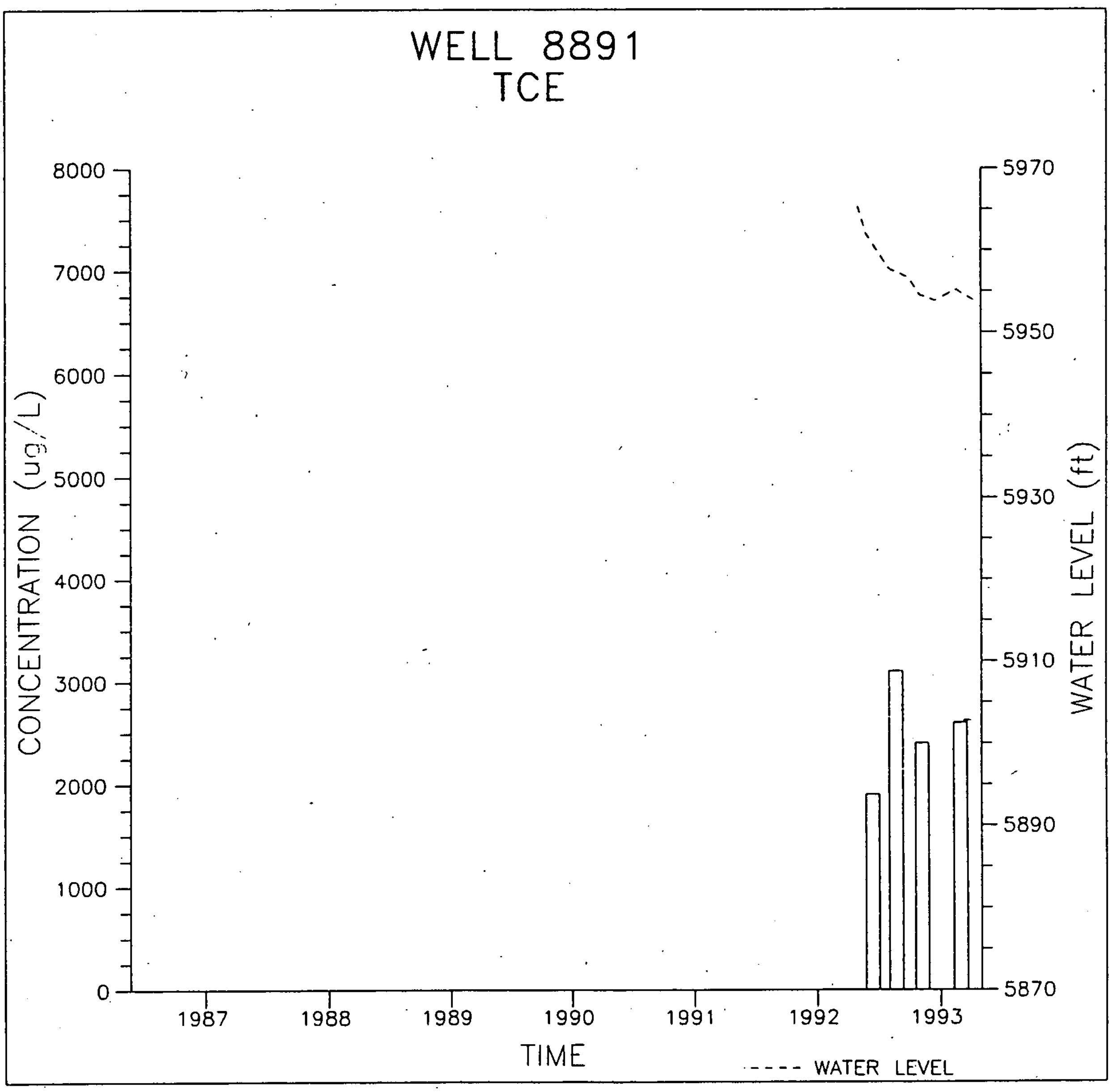
557



WELL 7391
TCE
CONCENTRATION (ug/L)
150000
125000
100000
75000
50000
25000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

551

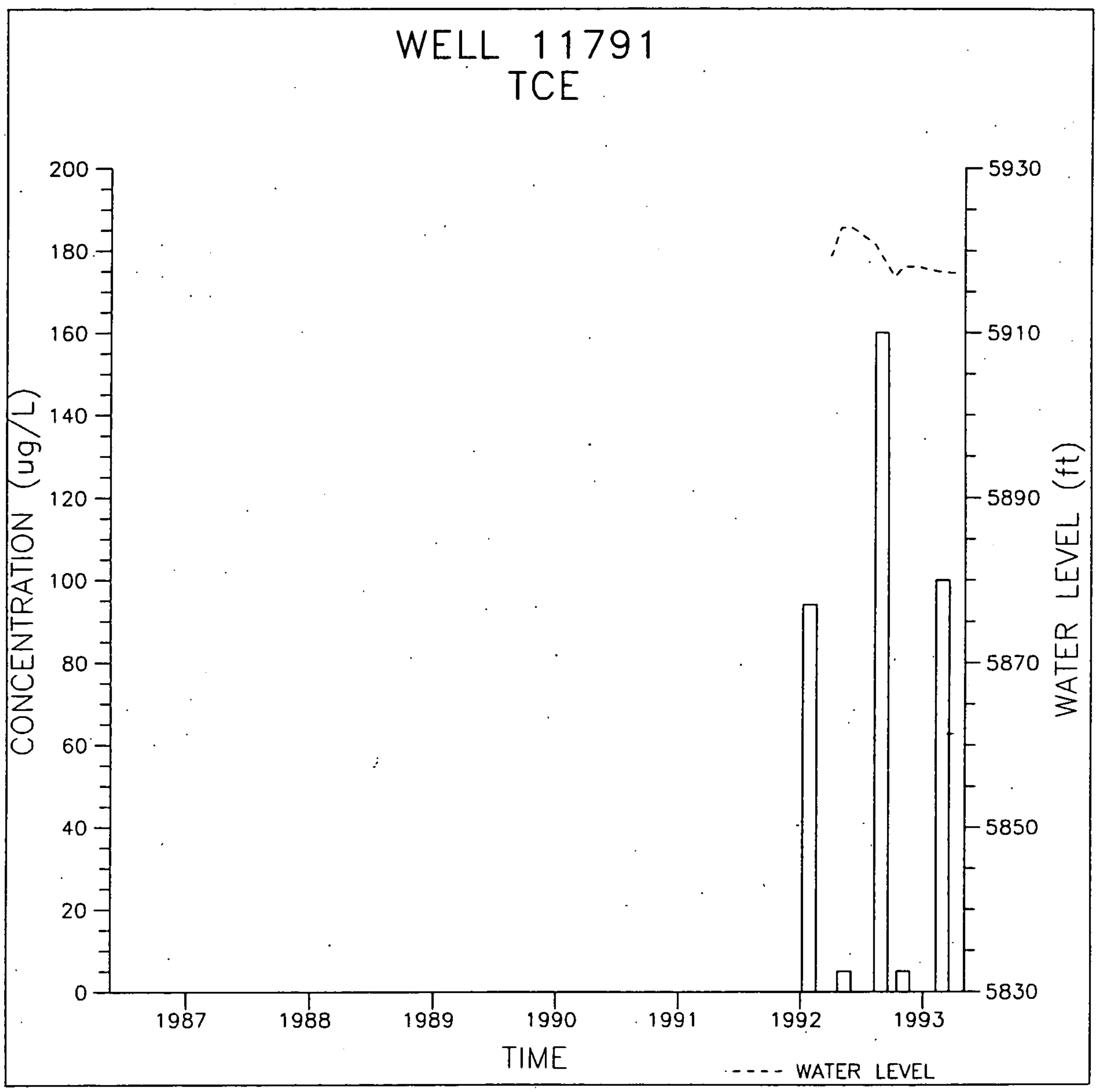

WELL 7891
TCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL 8891
TCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
8000
7000
6000
5000
4000
3000
2000
1000
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

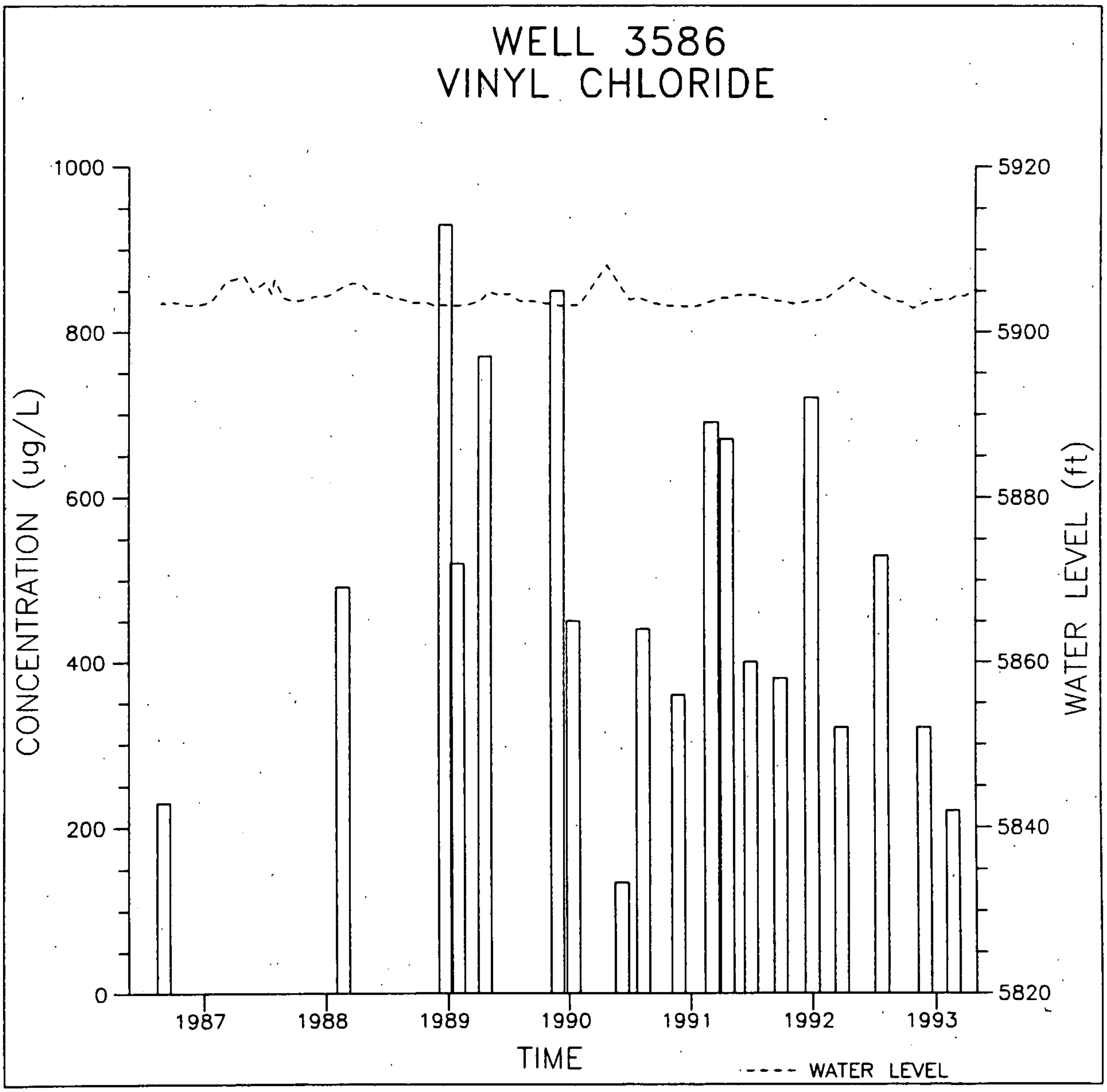
559

560


WELL 11791
TCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5830
5850
5870
5890
5910
5930
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

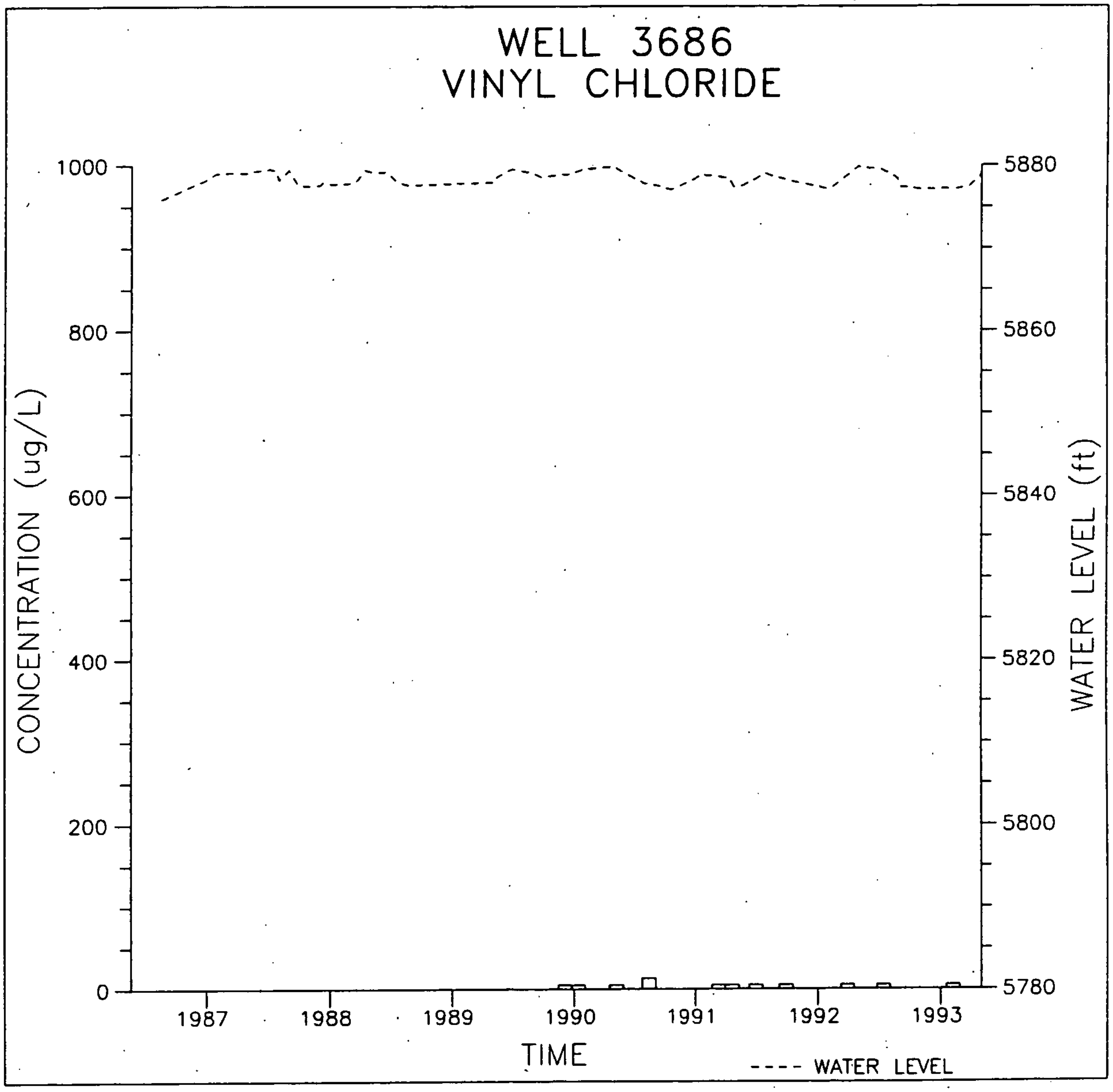
560

561


WELL 3586
VINYL CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
200
400
600
800
1000
5820
5840
5860
5880
5900
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

561

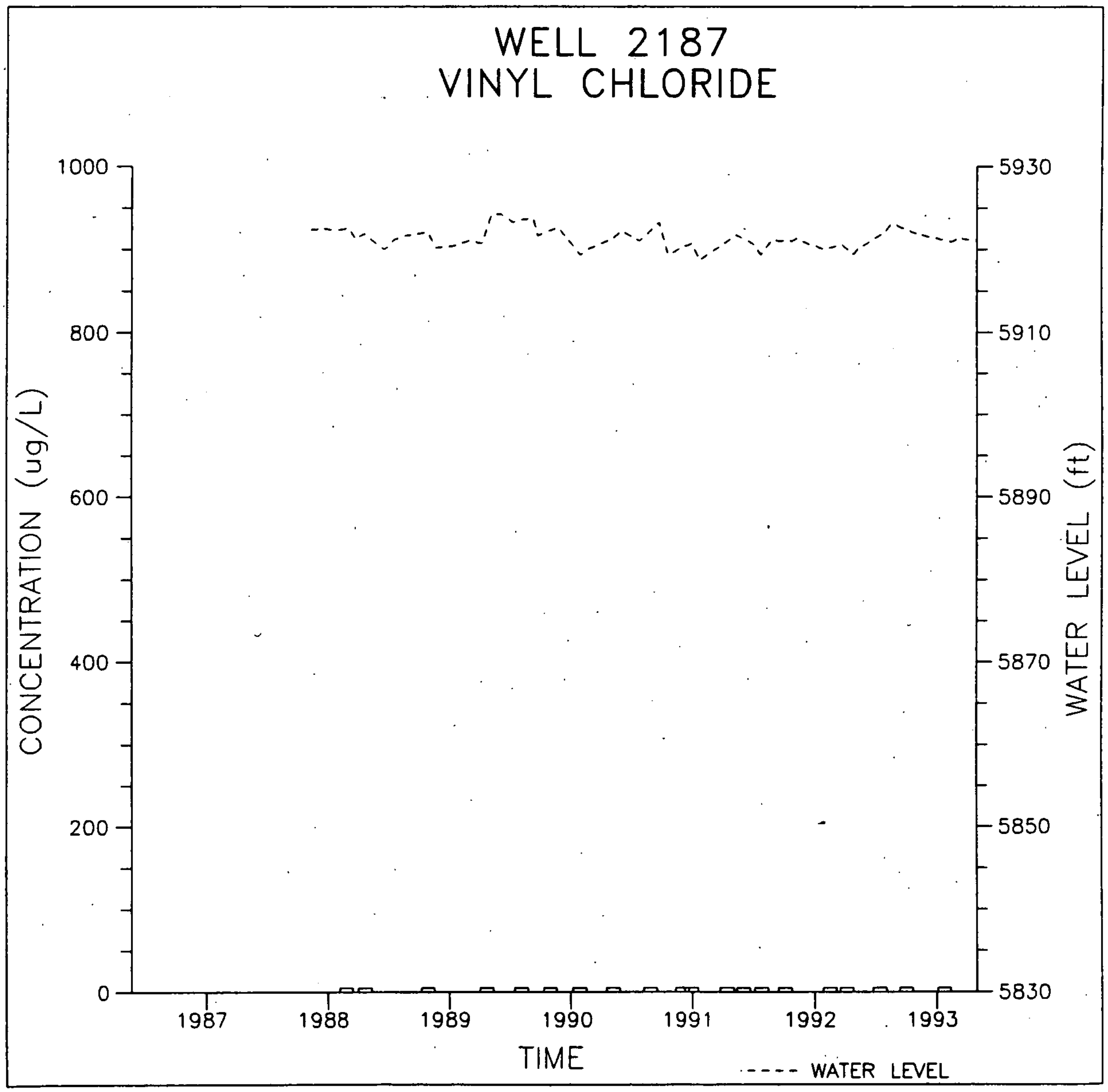
562



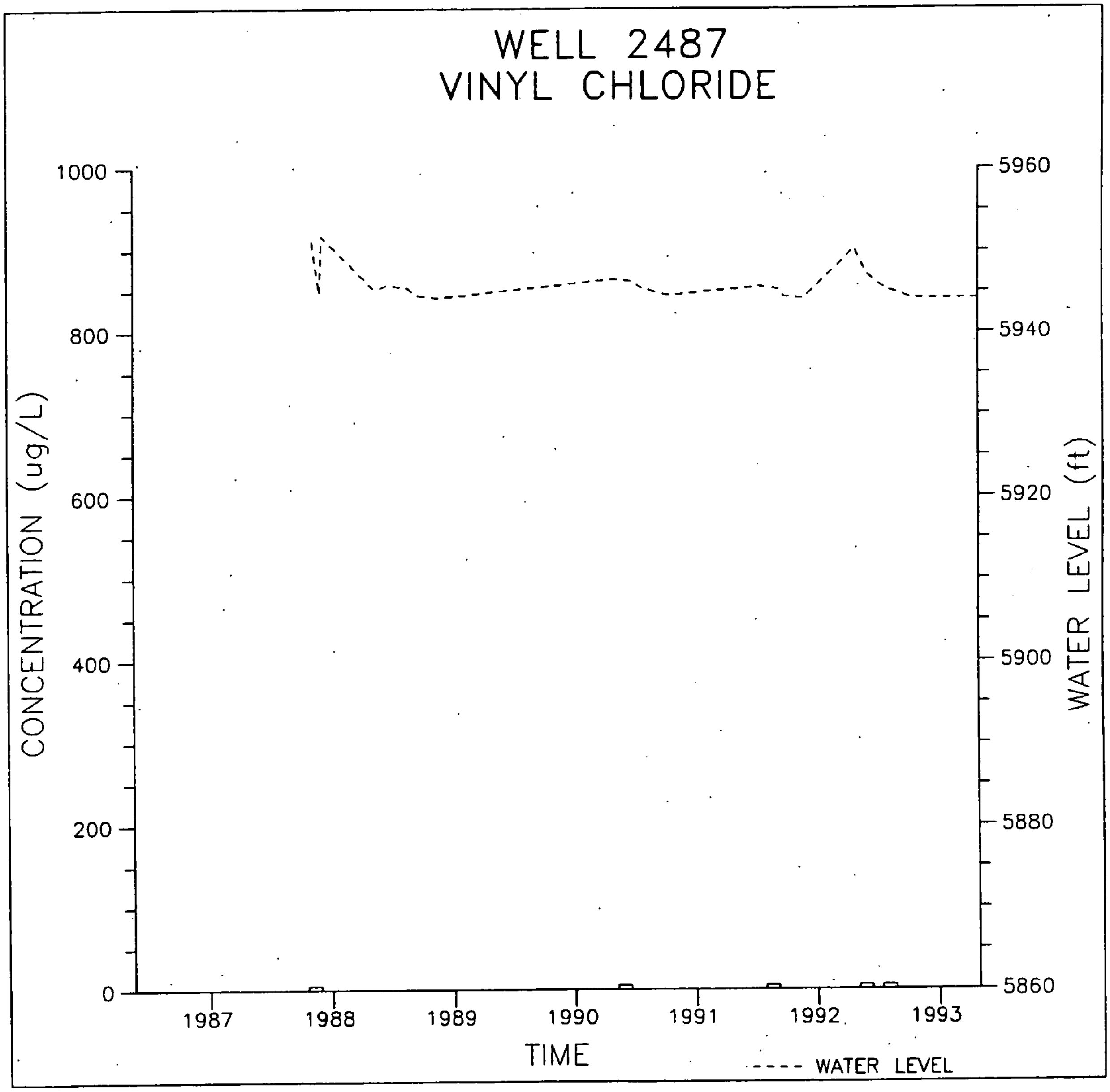
WELL 3686
VINYL CHLORIDE
CONCENTRATION (ug/L)
1000
800
600
400
200
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

562

563


WELL 2187
VINYL CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
1000
800
600
400
200
0
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

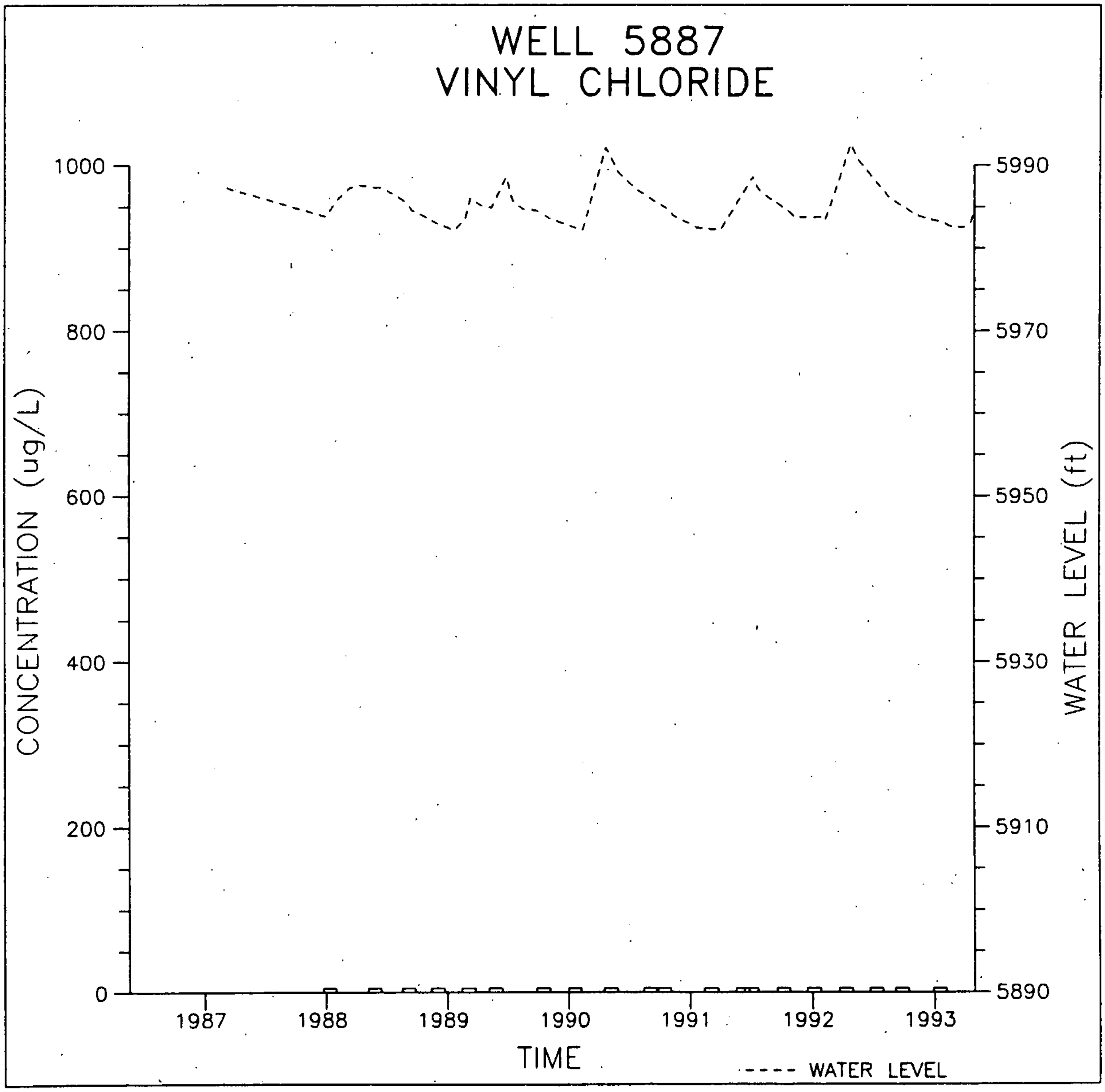
563



WELL 2487
VINYL CHLORIDE
CONCENTRATION (ug/L)
1000
800
600
400
200
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

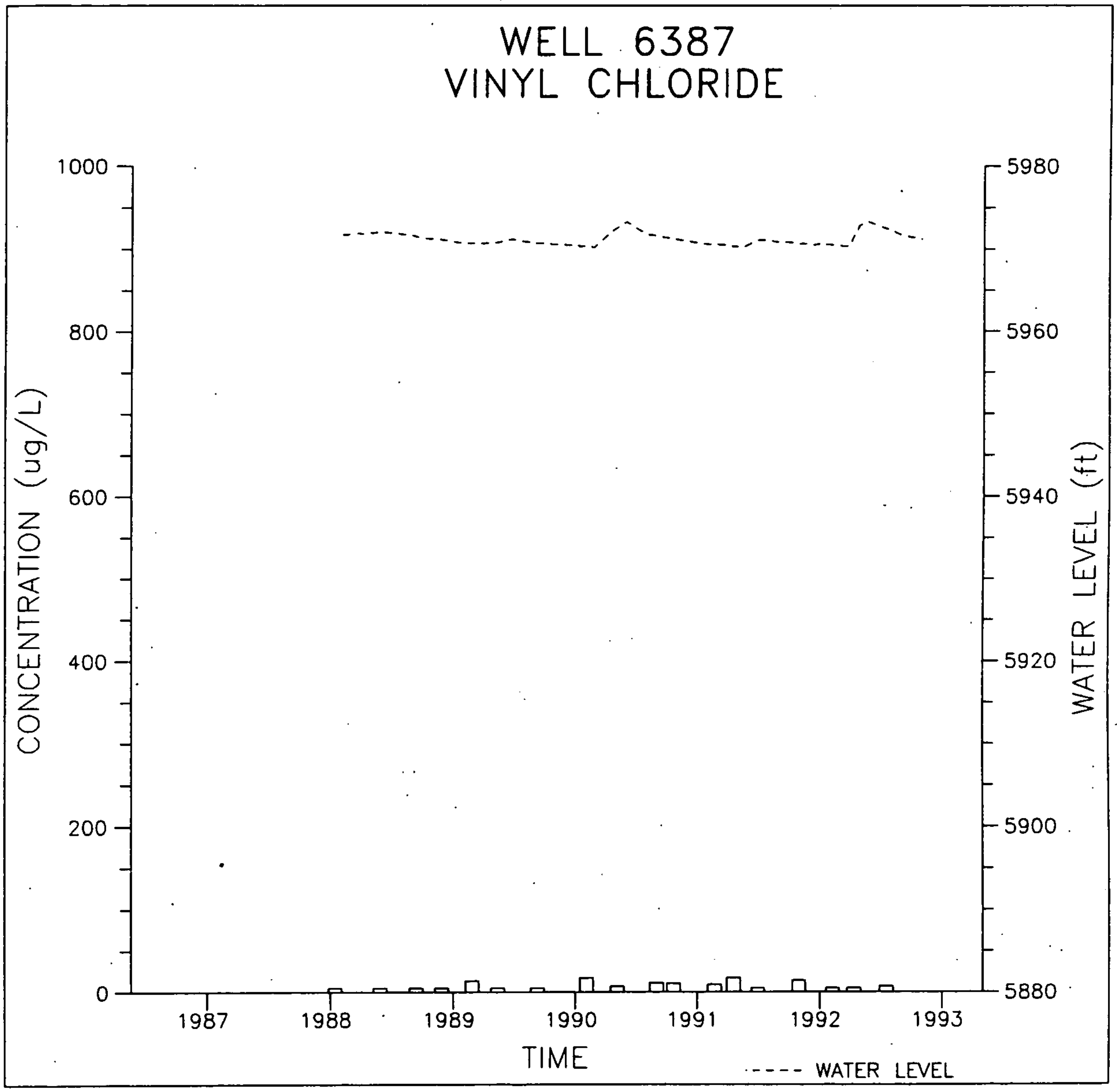
564

565



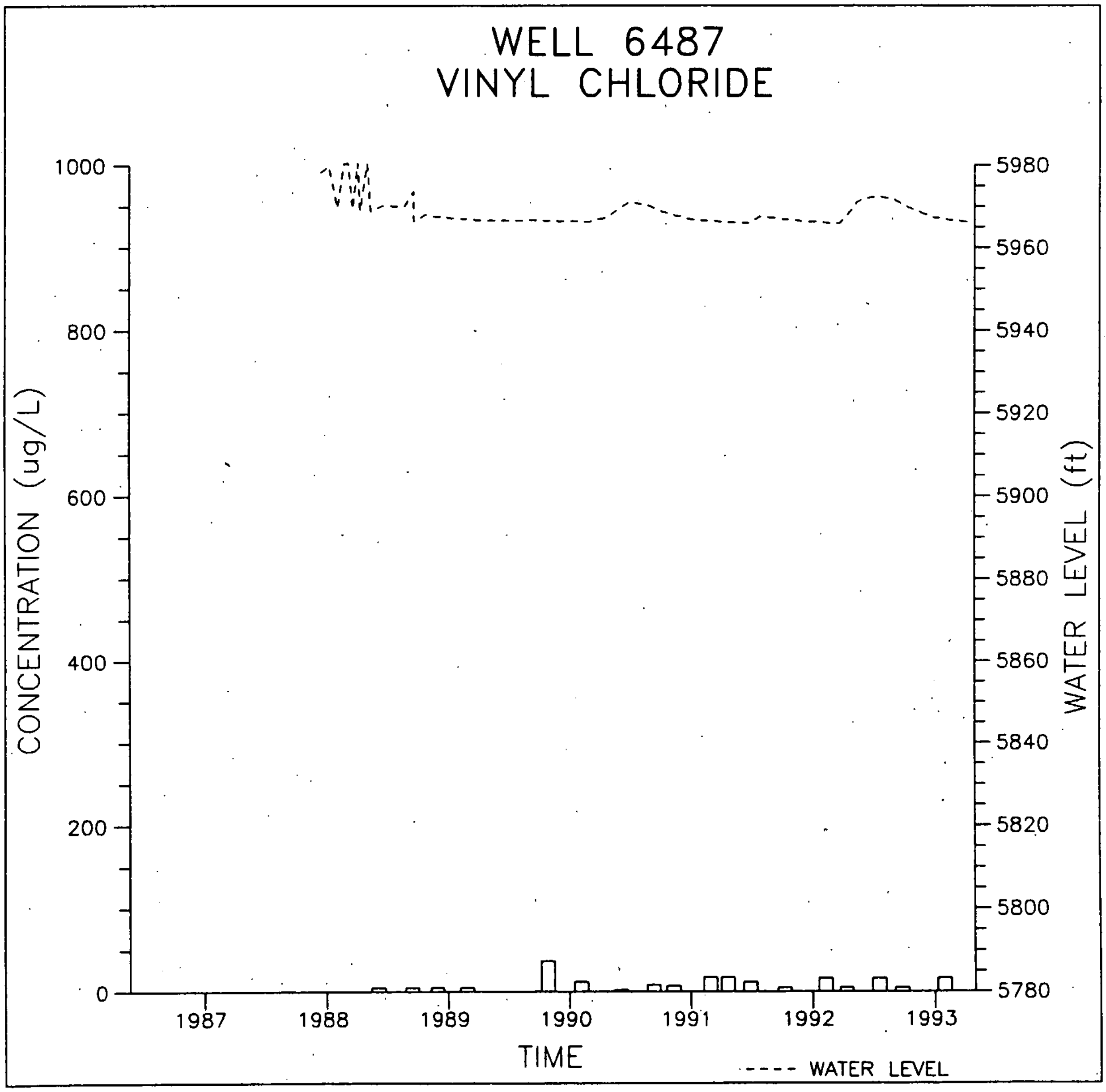
WELL 5887
VINYL CHLORIDE
CONCENTRATION (ug/L)
1000
800
600
400
200
0
WATER LEVEL (ft)
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

565


WELL 6387
VINYL CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
1000
800
600
400
200
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

566

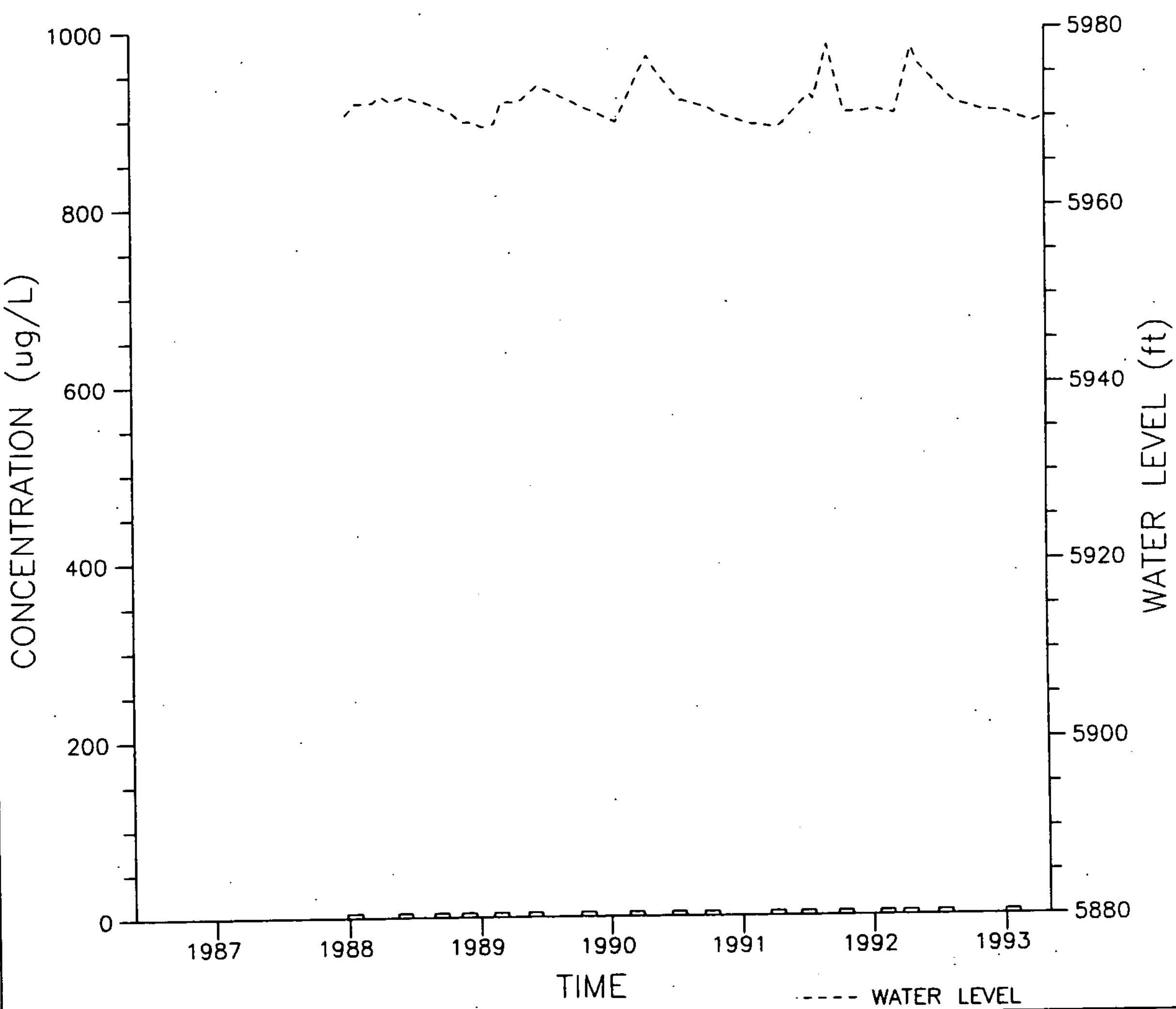
547


WELL 6487
VINYL CHLORIDE
CONCENTRATION (ug/L)
1000
800
600
400
200
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

567

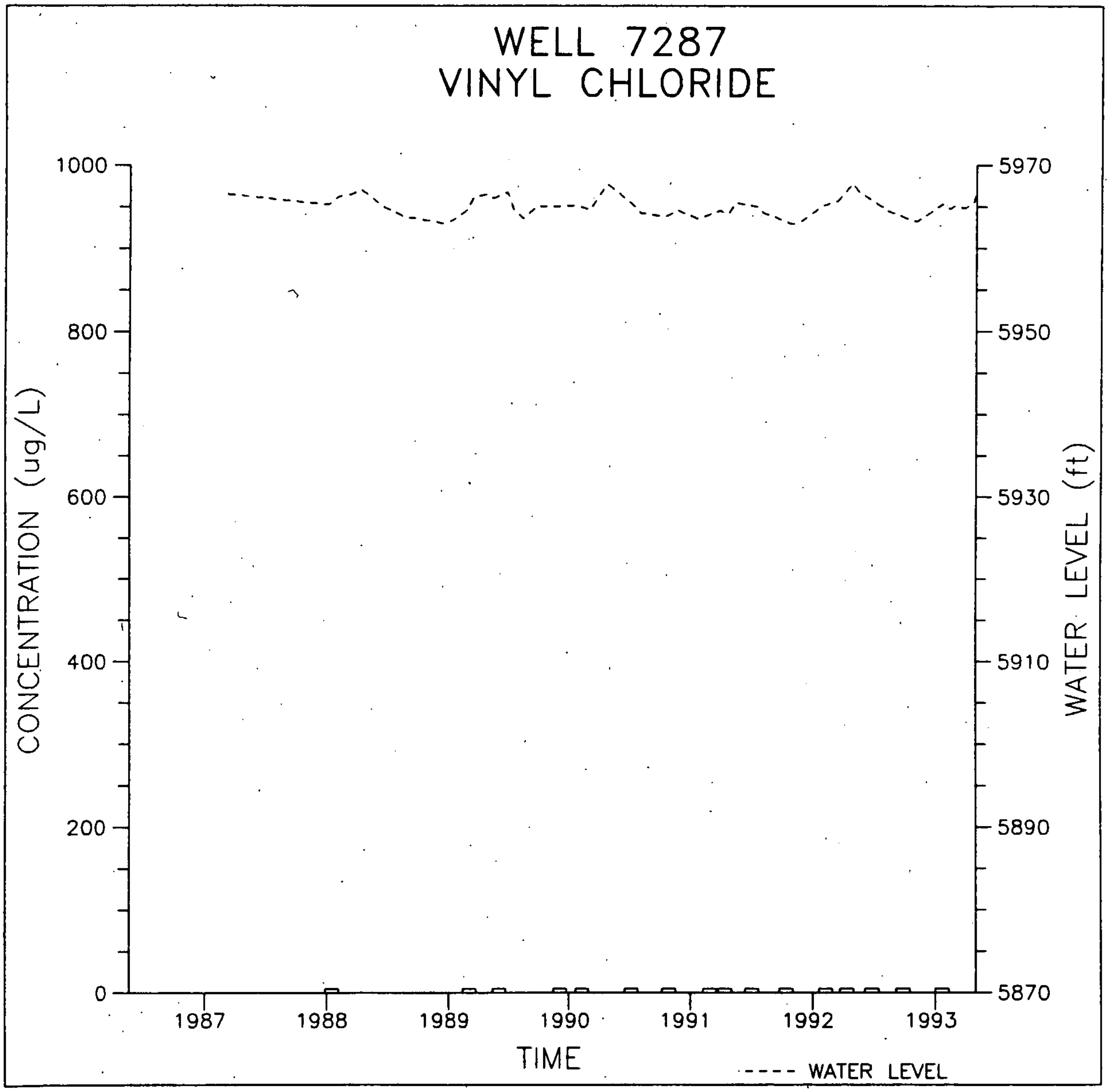
568

WELL 6587
VINYL CHLORIDE



568

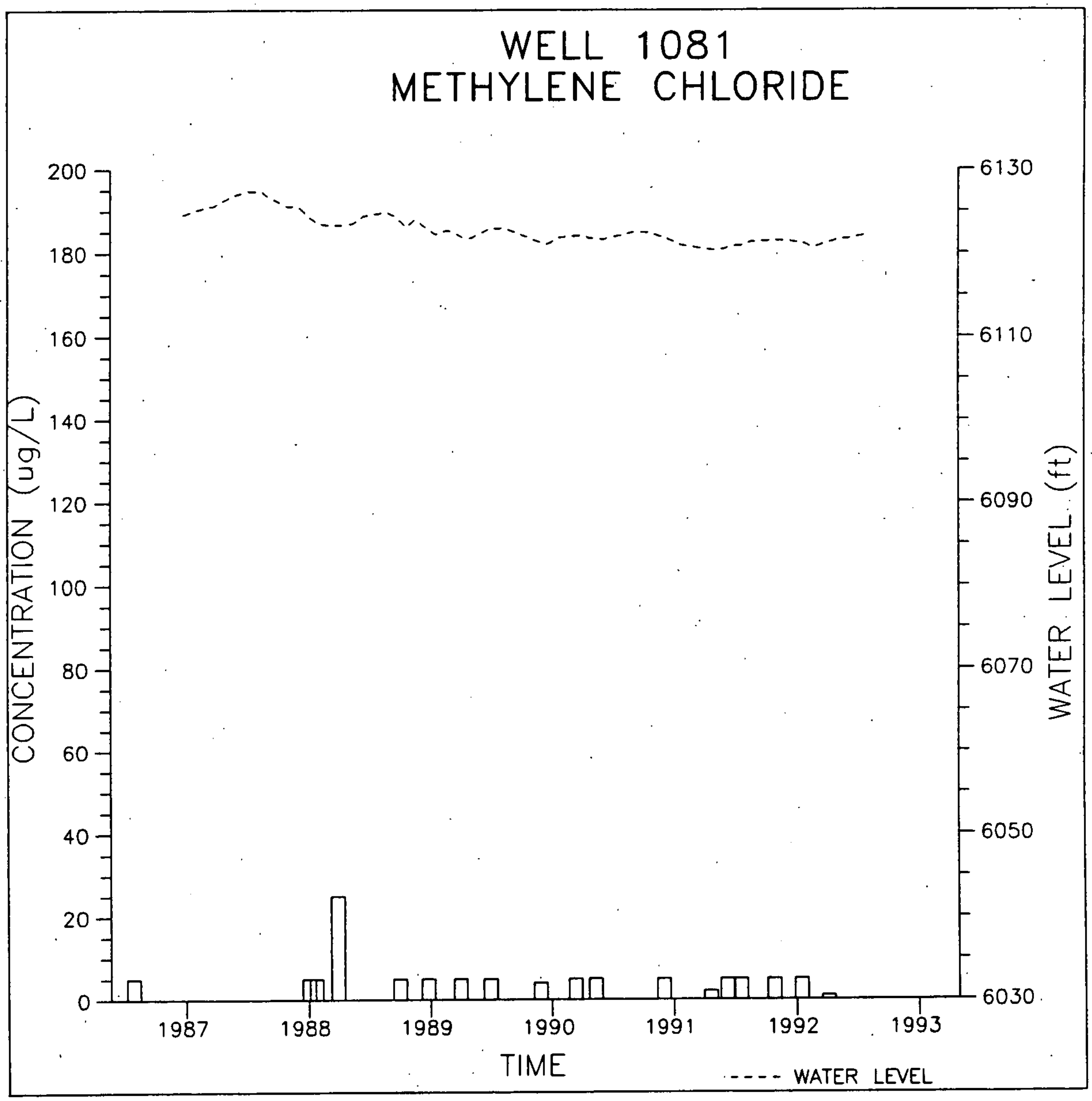
59



WELL 7287
VINYL CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
1000
800
600
400
200
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

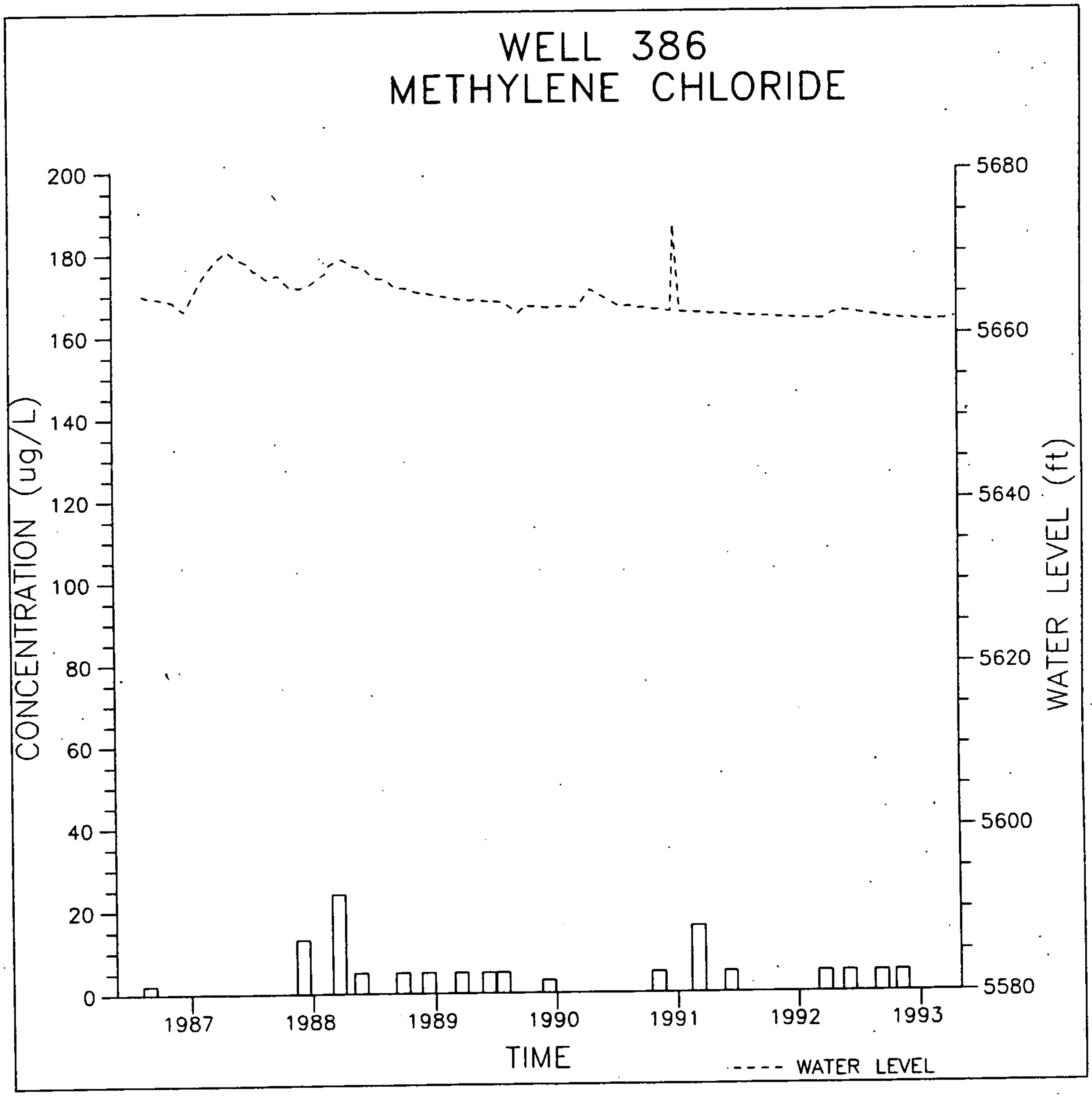
569

570


WELL 1081
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6130
6110
6090
6070
6050
6030
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

570

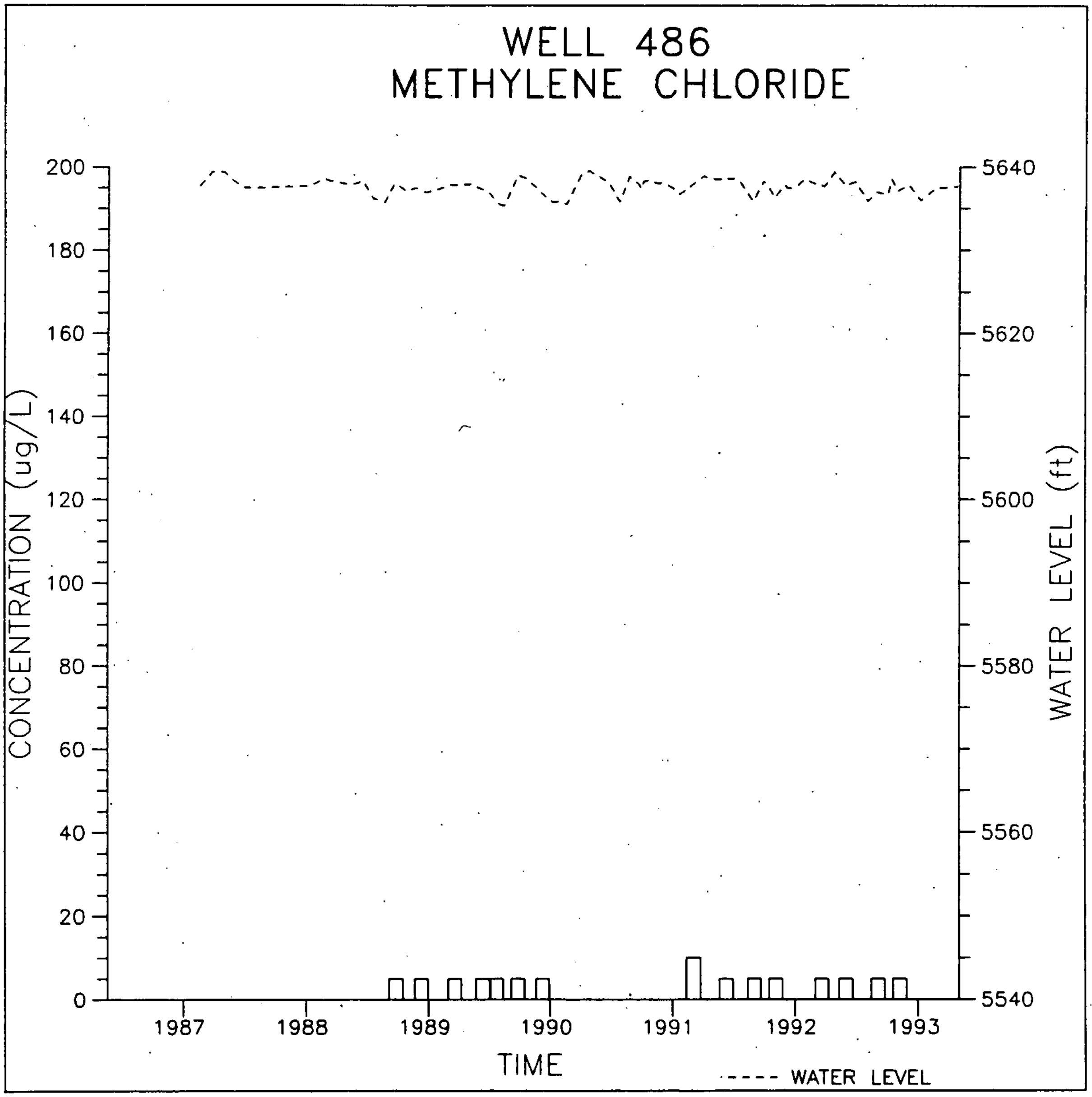
571



WELL 386
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5680
5660
5640
5620
5600
5580
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

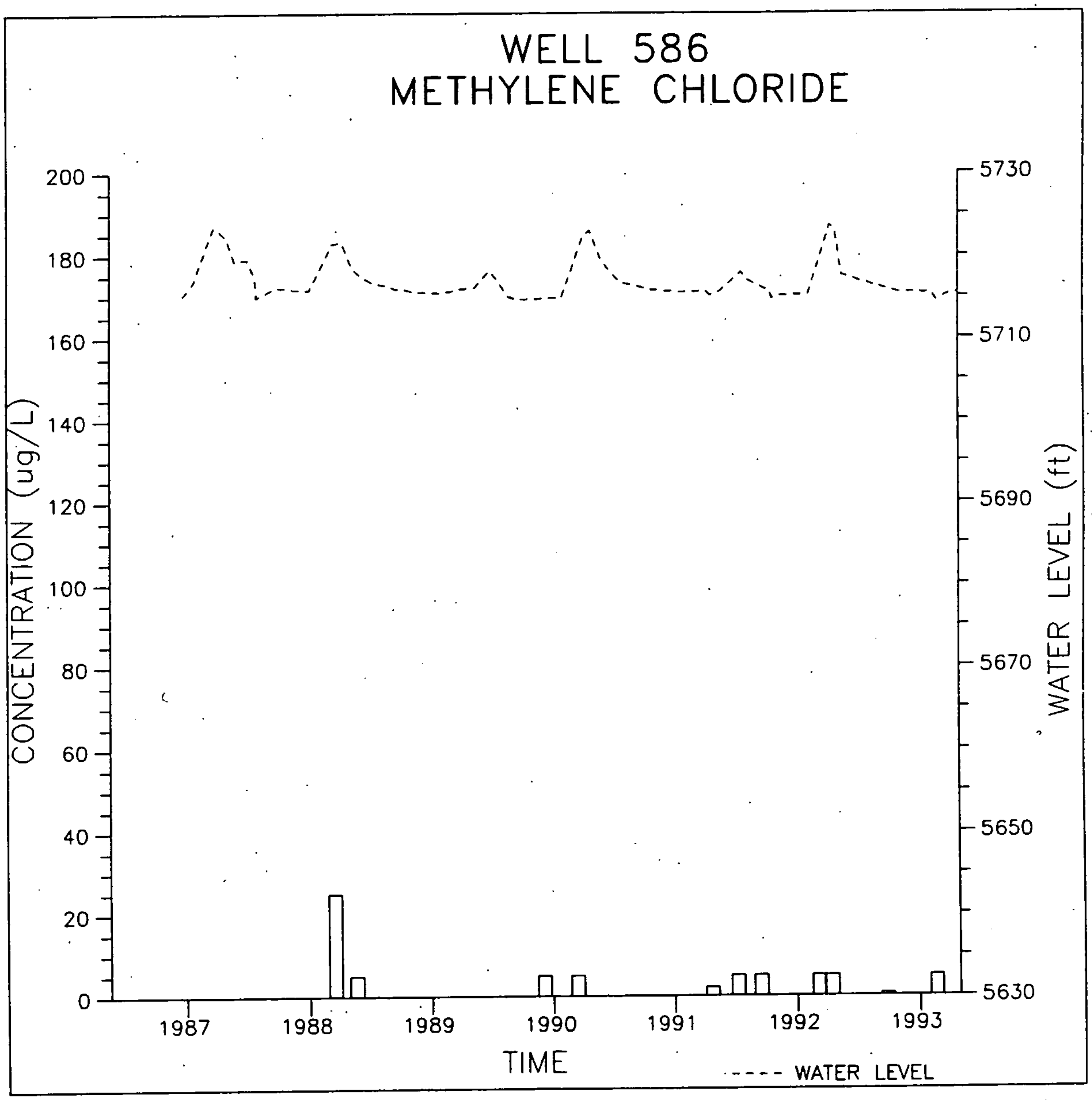
571

577


WELL 486
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5640
5620
5600
5580
5560
5540
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

572

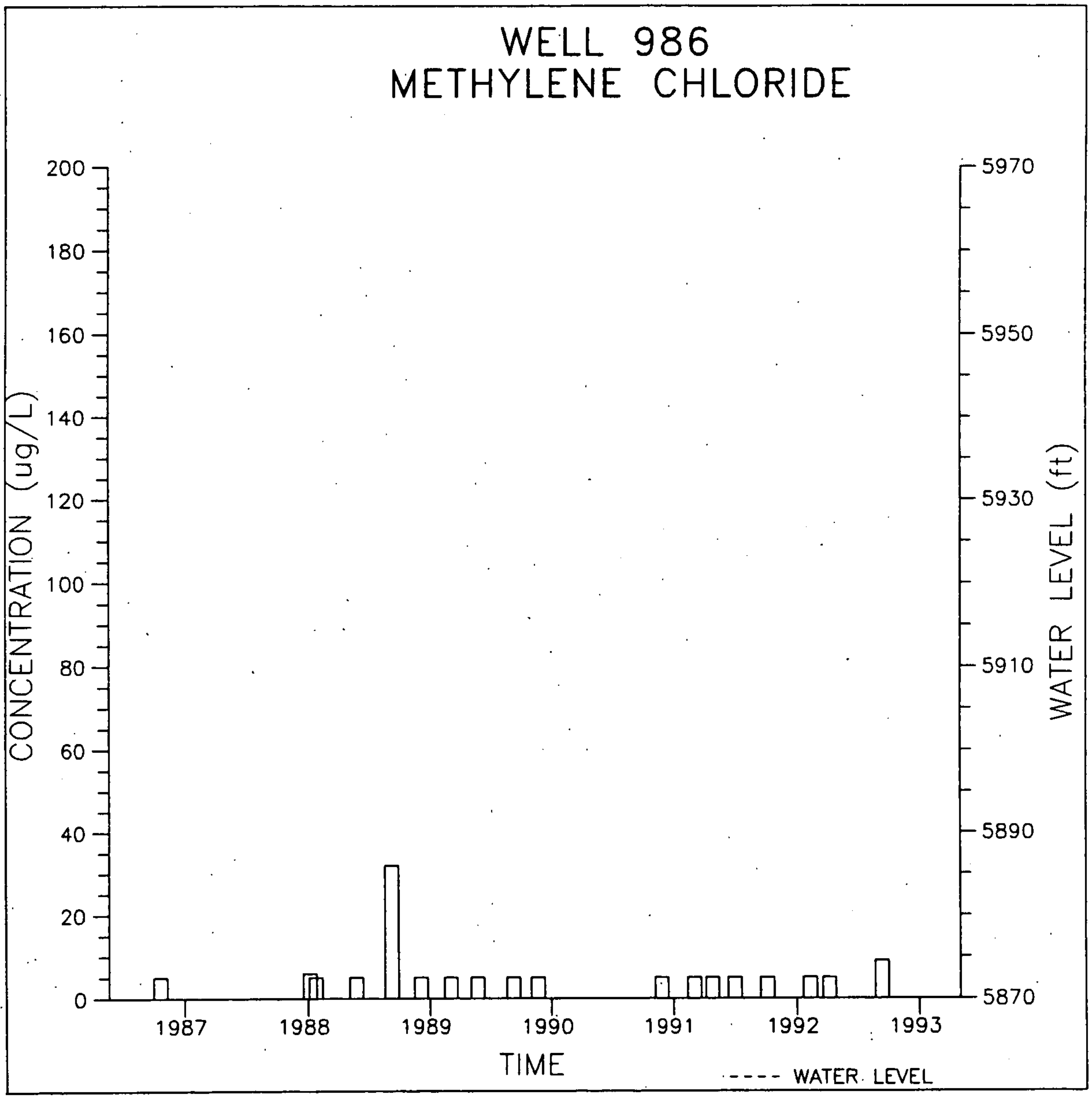
573

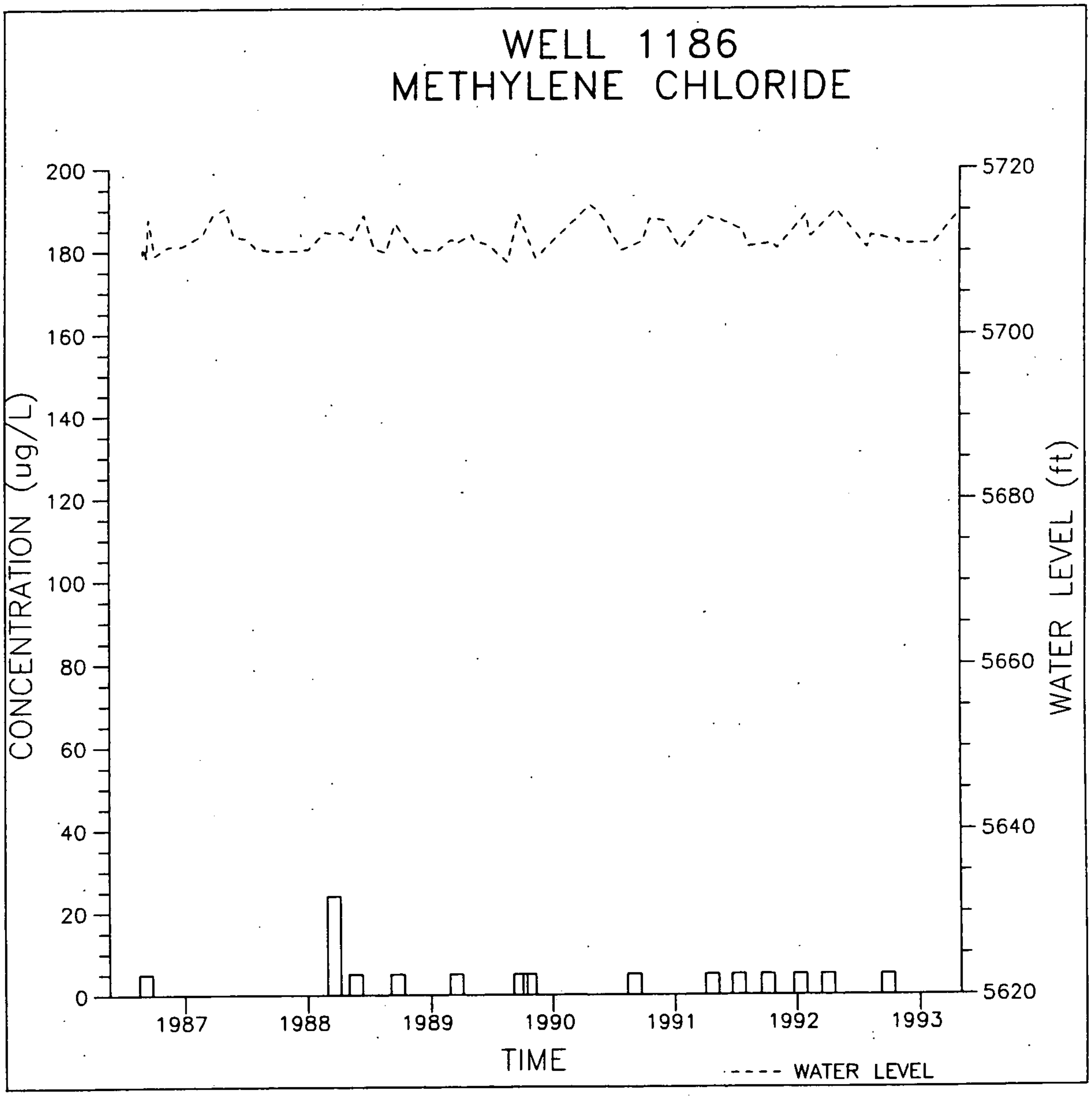


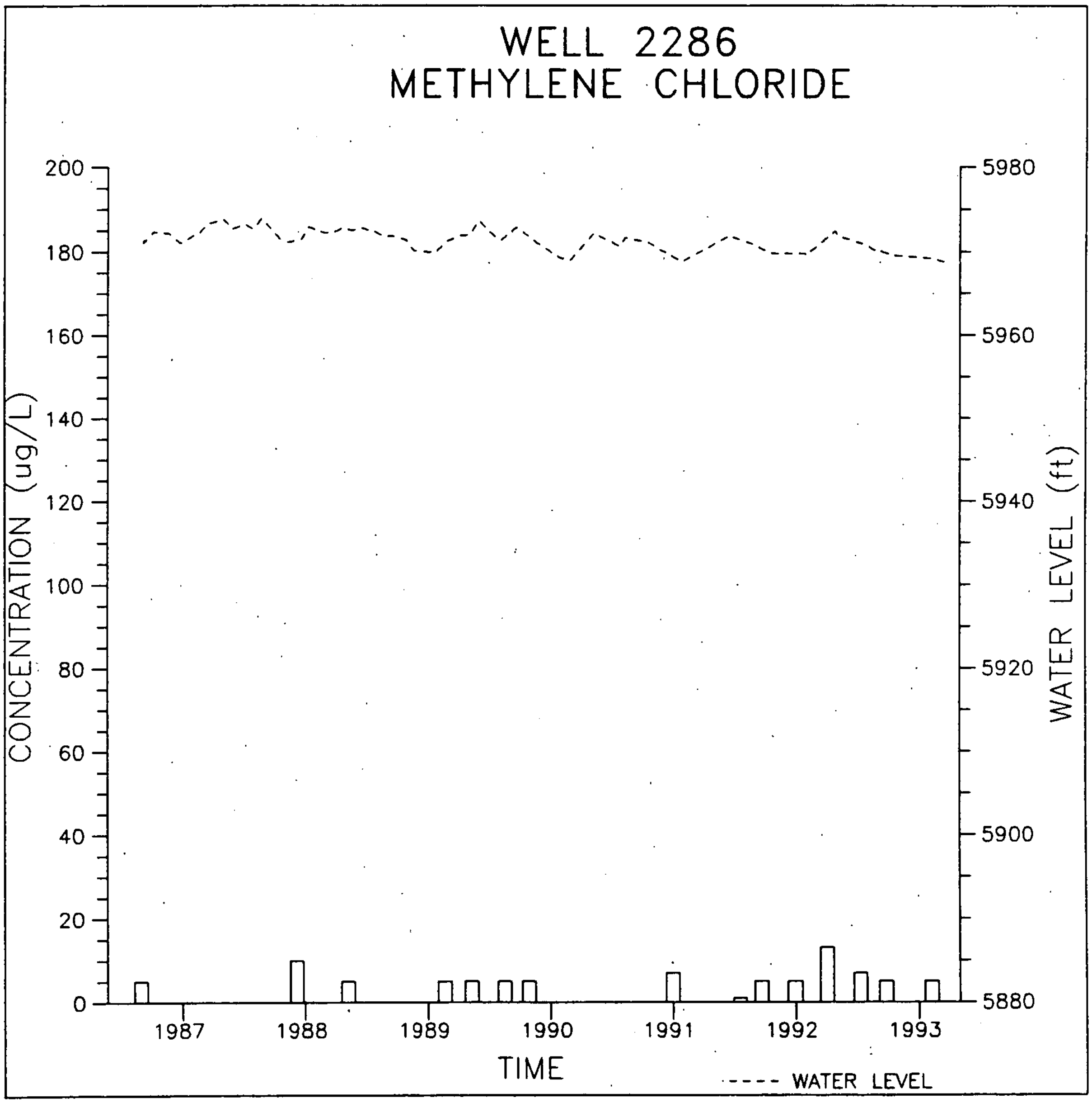
WELL 586
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5730
5710
5690
5670
5650
5630
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

573

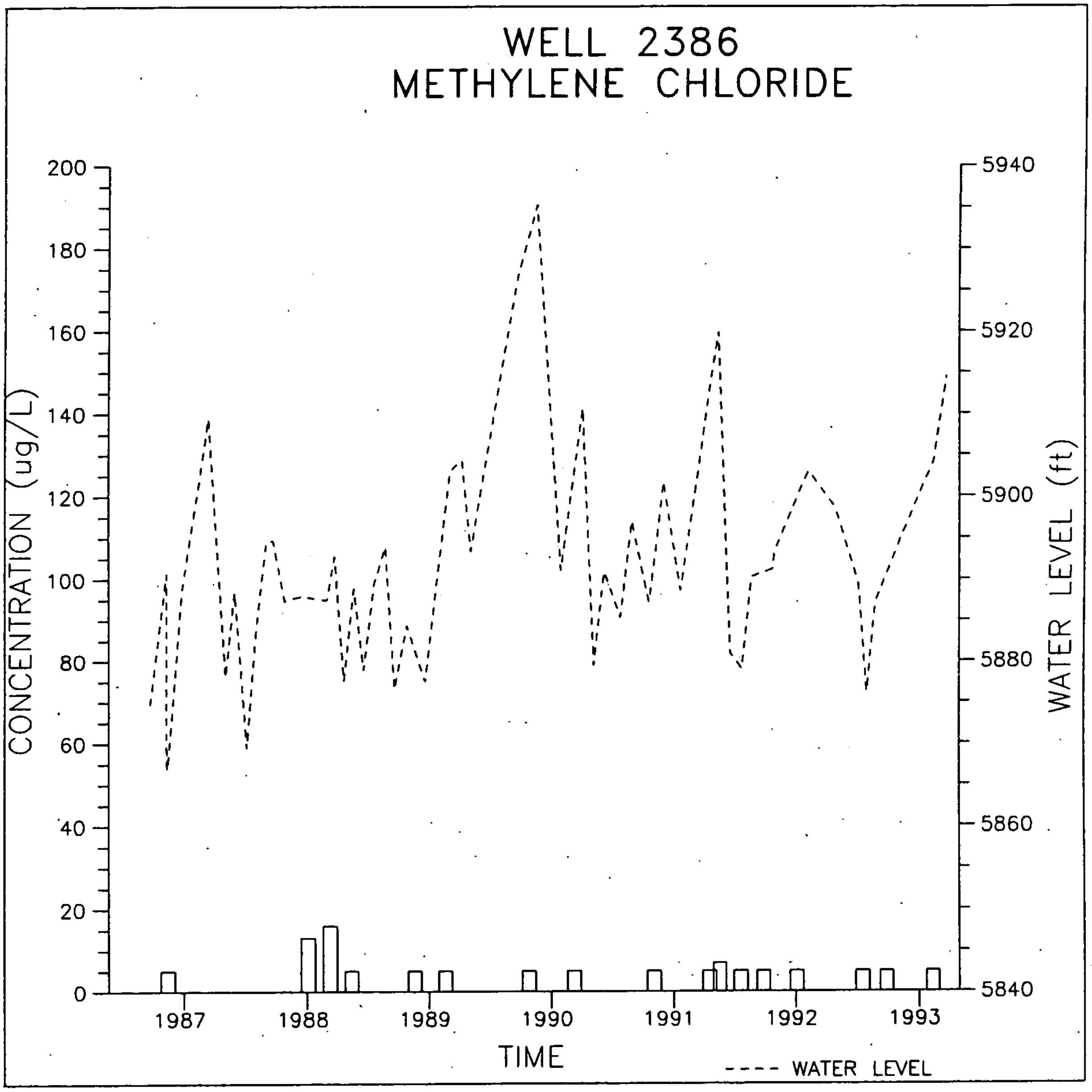
574


WELL 986
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
---- WATER LEVEL


WELL 1186
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5720
5700
5680
5660
5640
5620
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL


WELL 2286
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

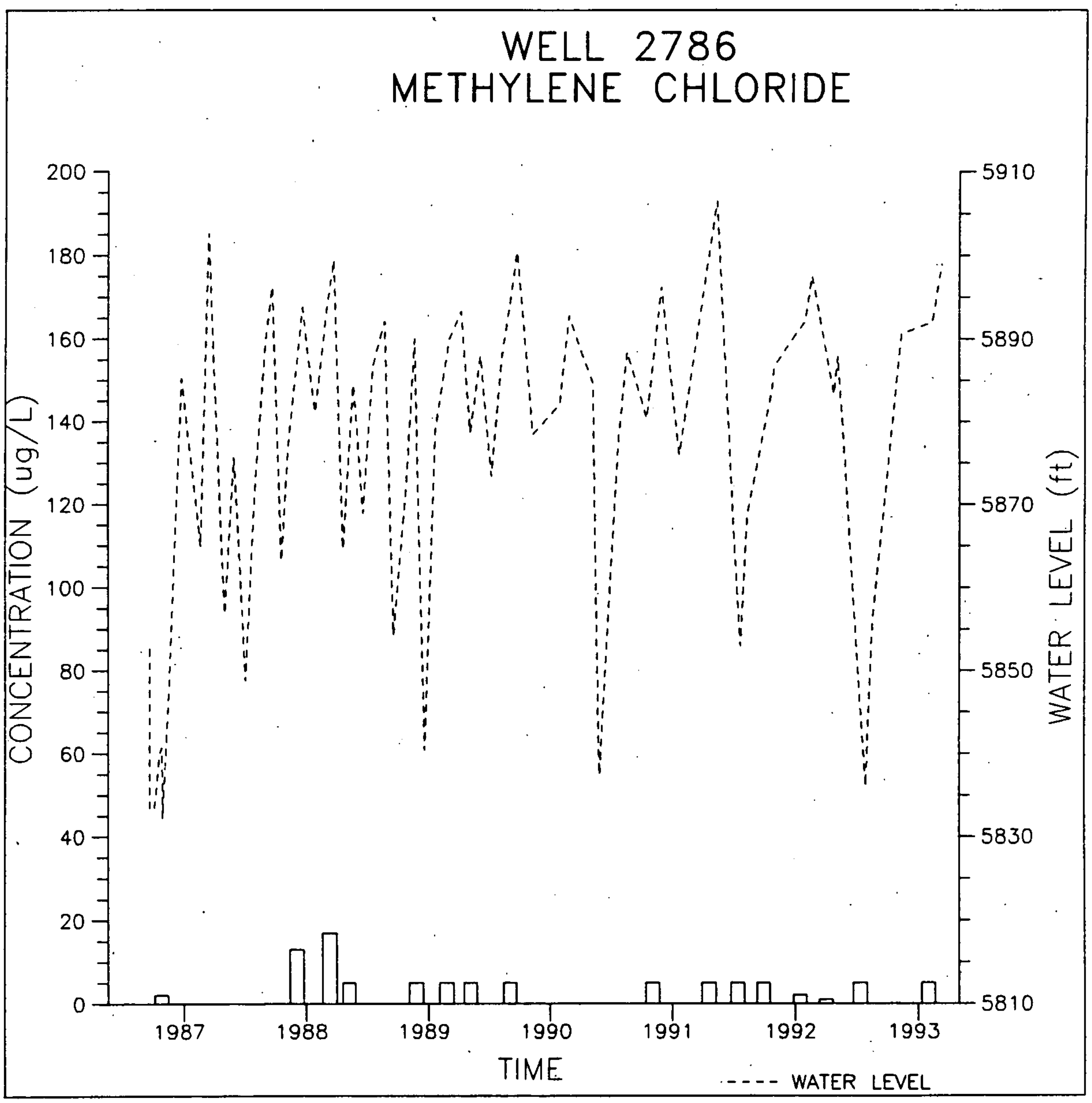
576



WELL 2386
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

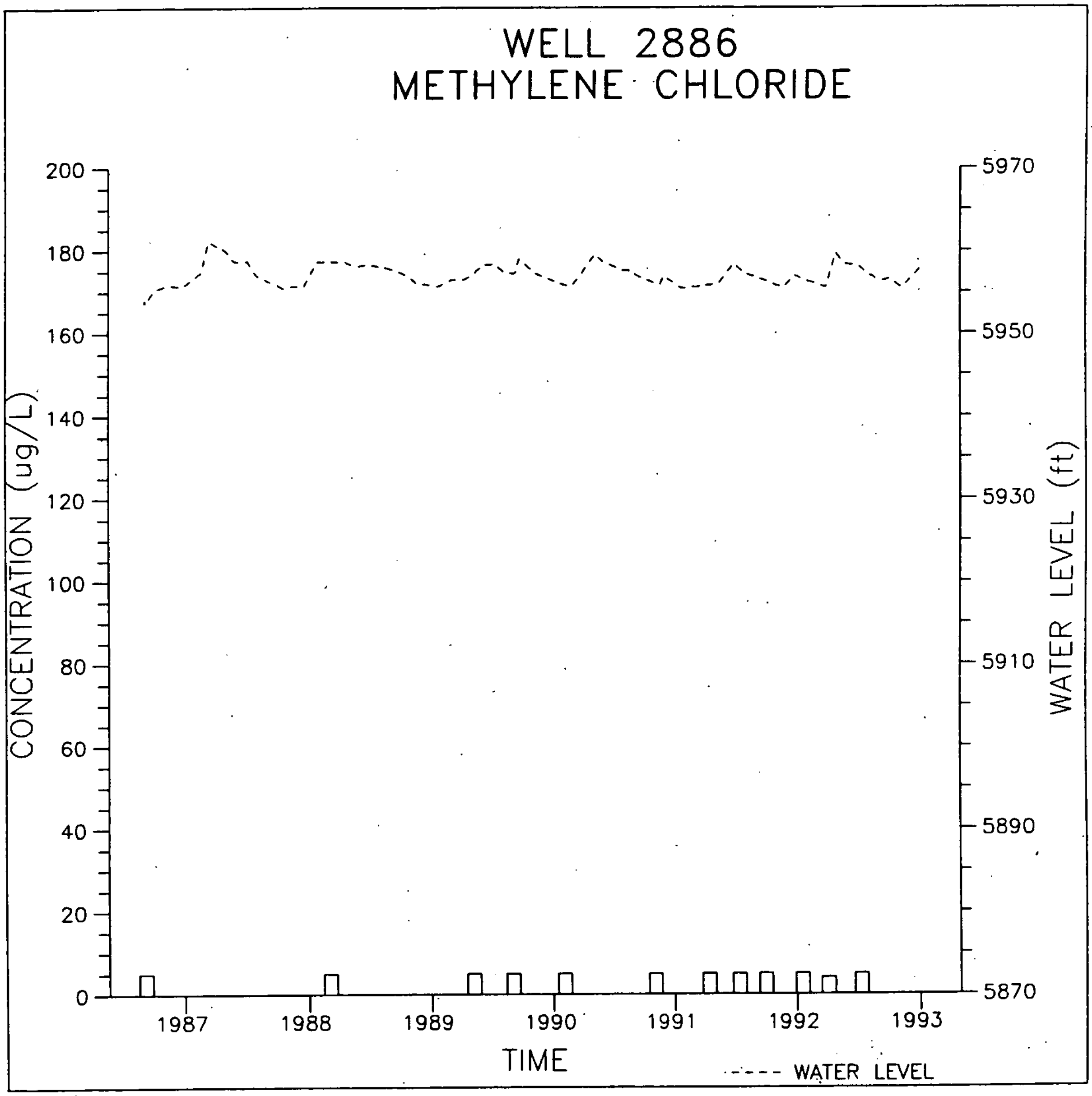
577

~~578~~



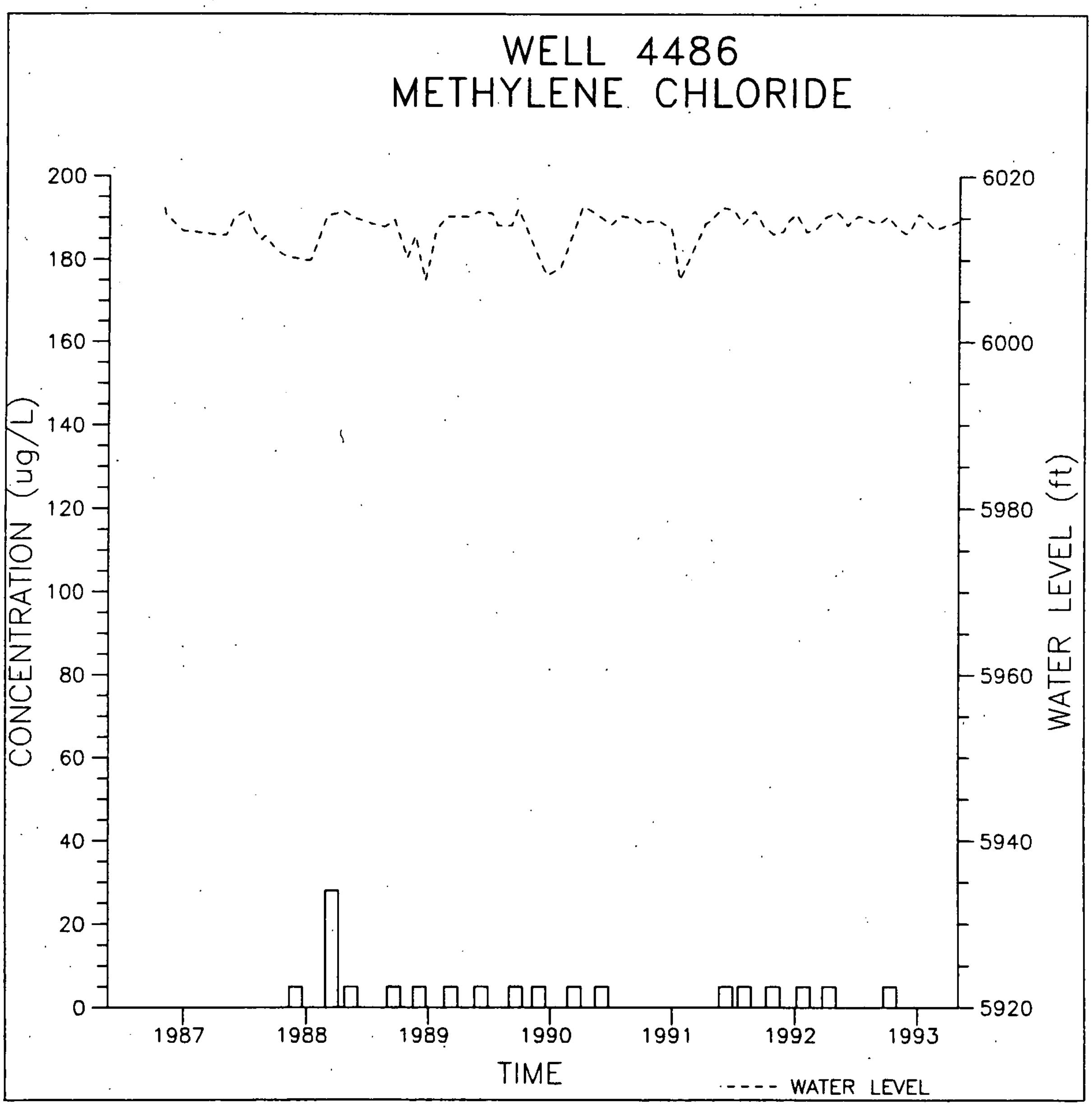
WELL 2786
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

578


WELL 2886
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

579

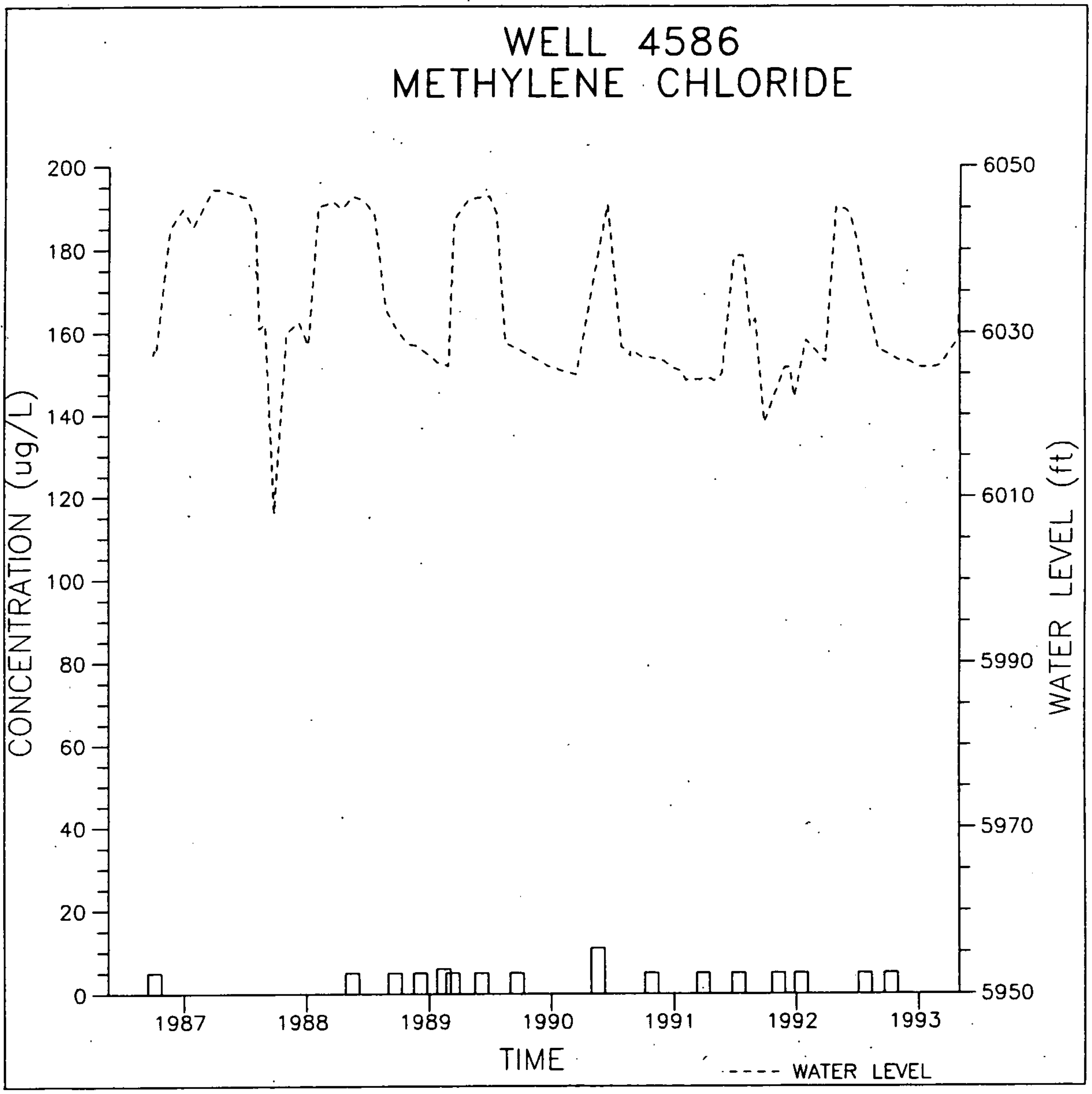
580



WELL 4486
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

580

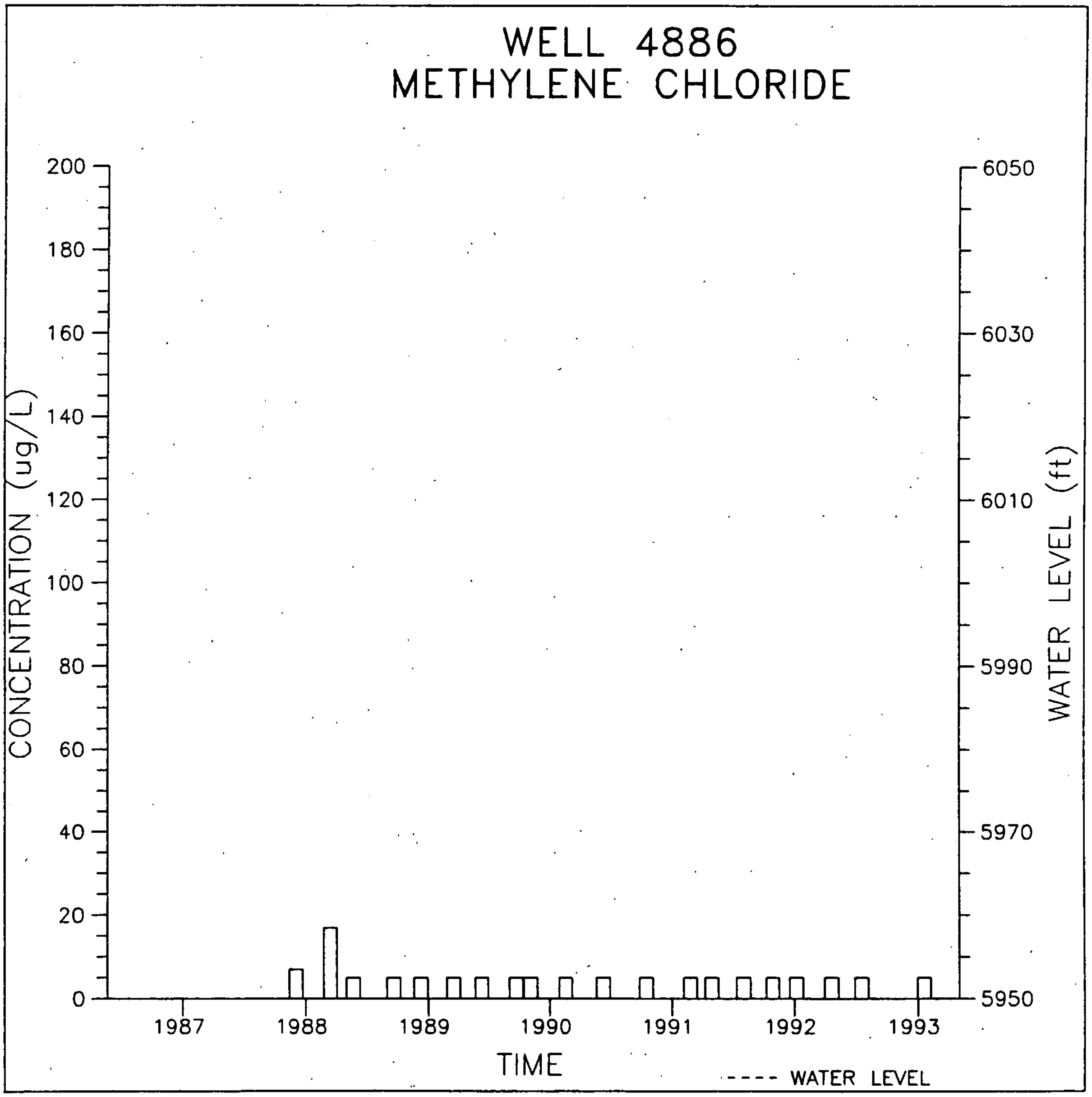
581



WELL 4586
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

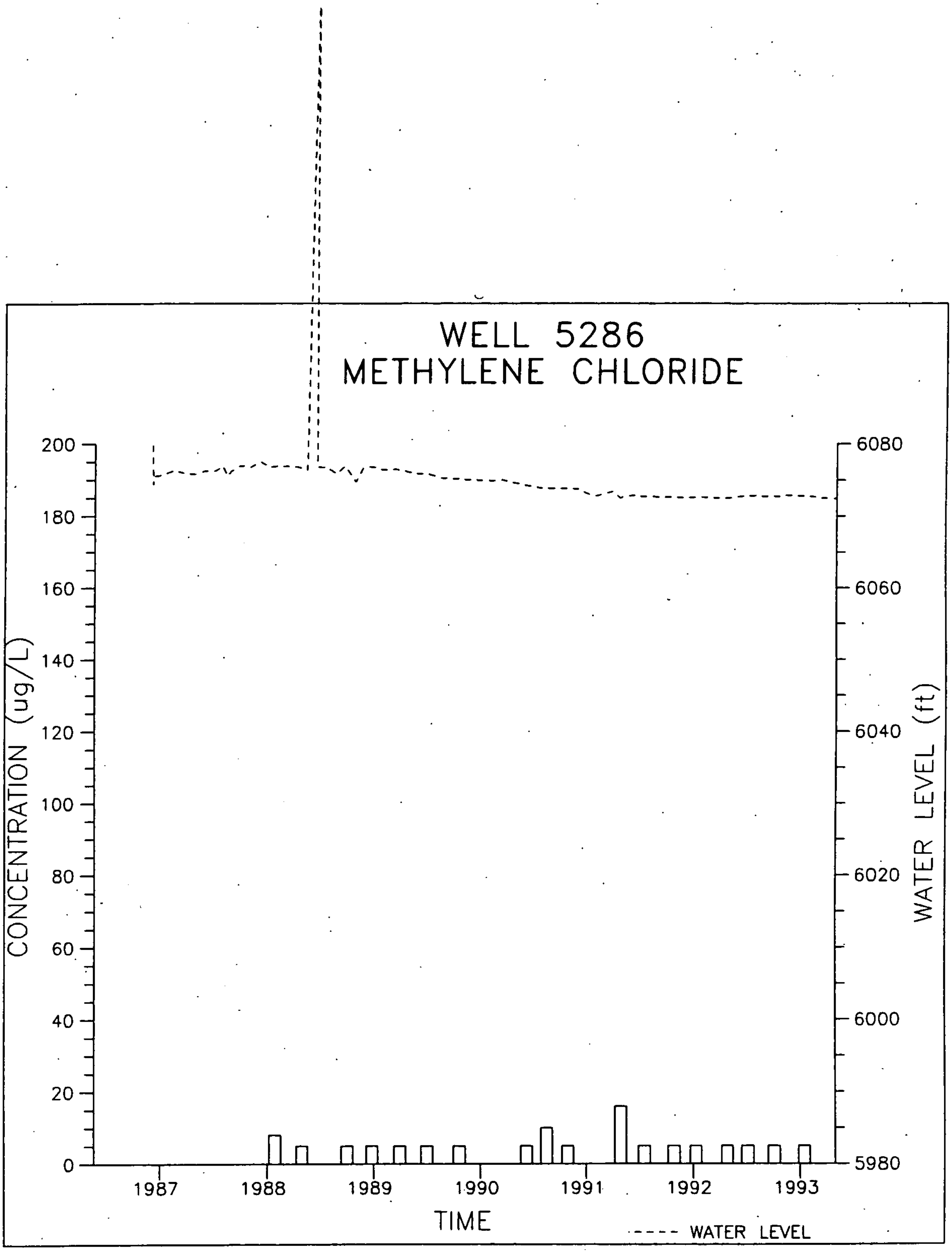
581

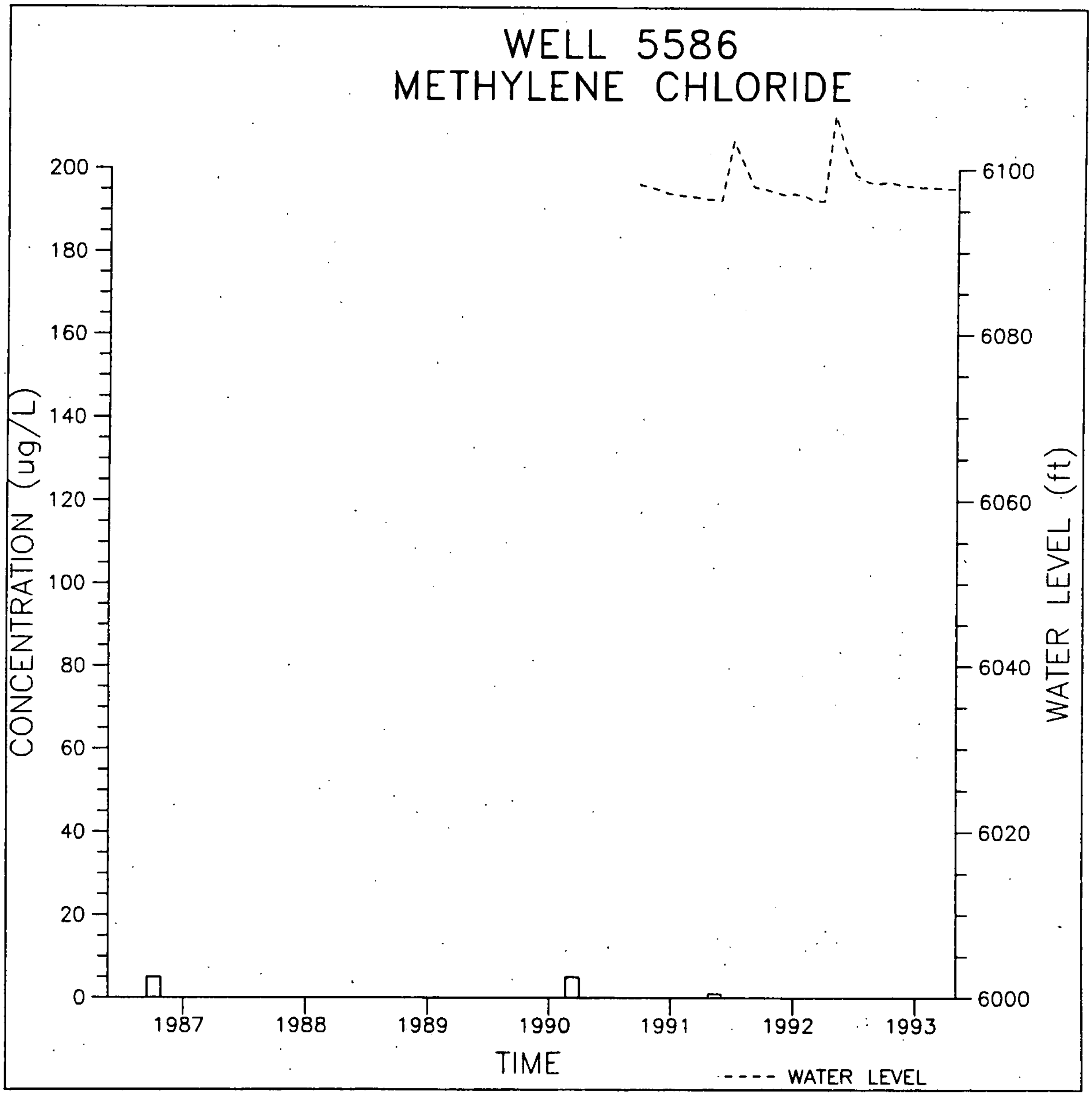
582


WELL 4886
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

582

583

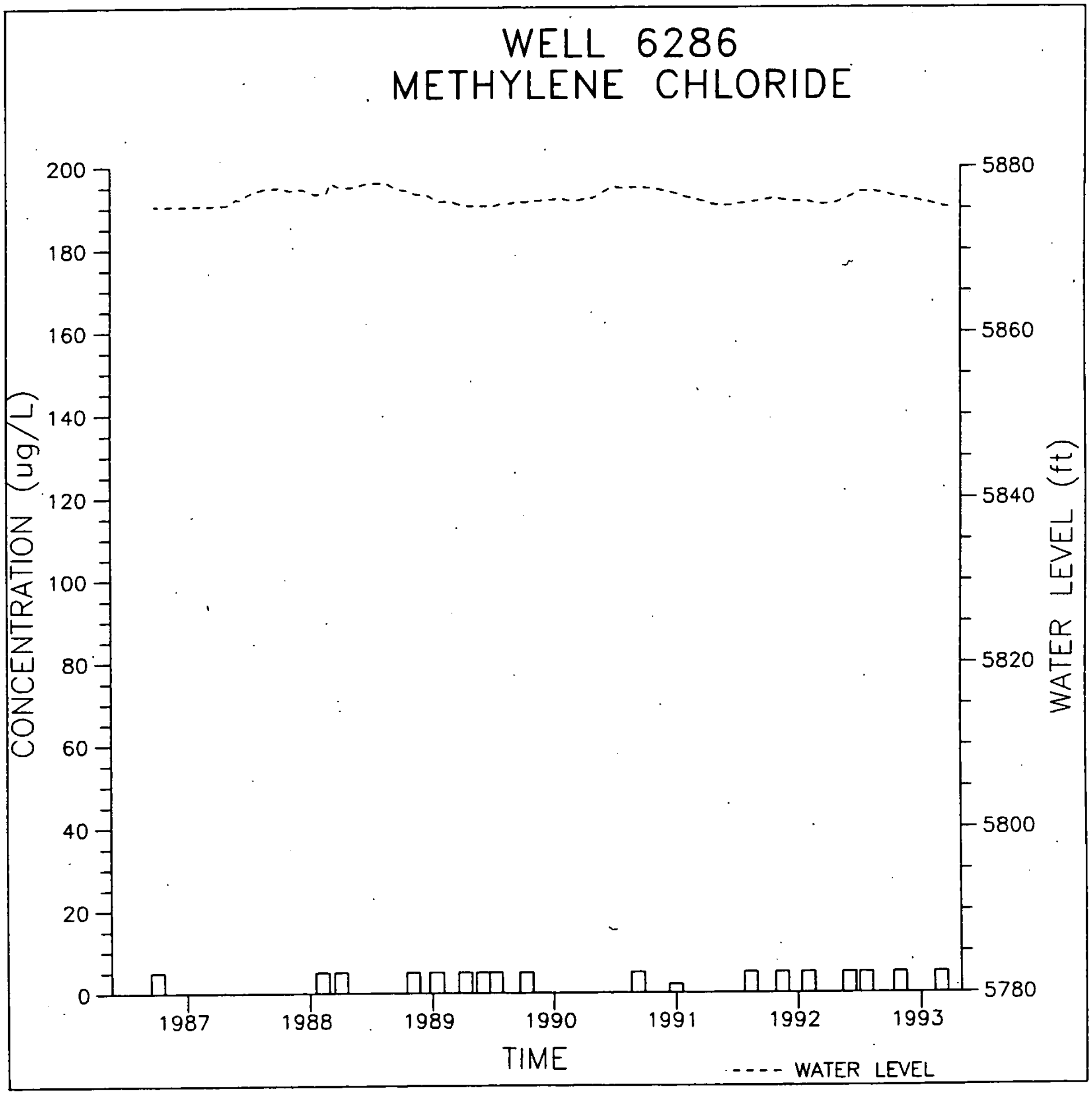

WELL 5286
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6080
6060
6040
6020
6000
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL 5586
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6100
6080
6060
6040
6020
6000
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

584

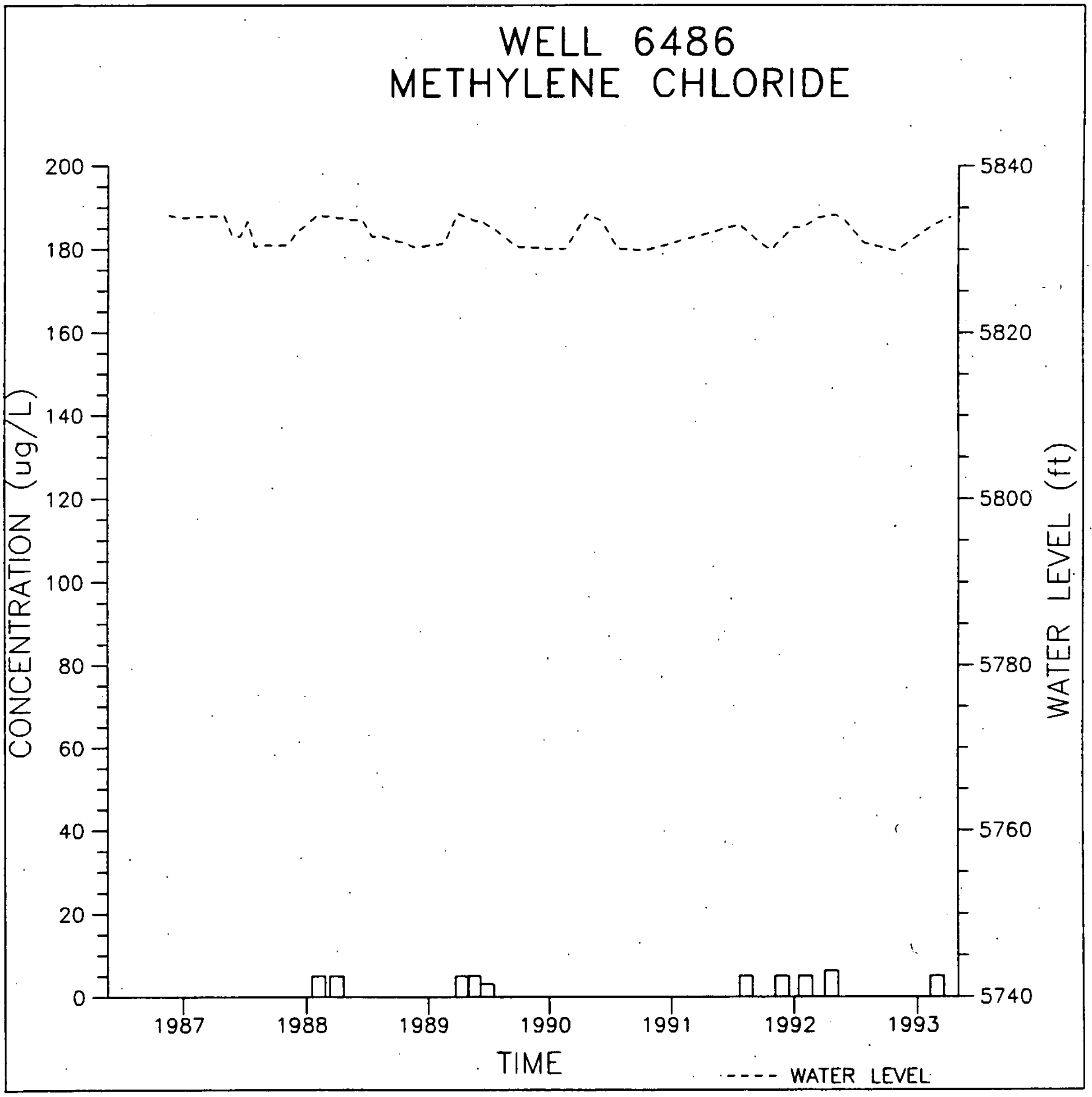
585



WELL 6286
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5780
5800
5820
5840
5860
5880
1987
1988
1989
1990
1991
1992
1993

585

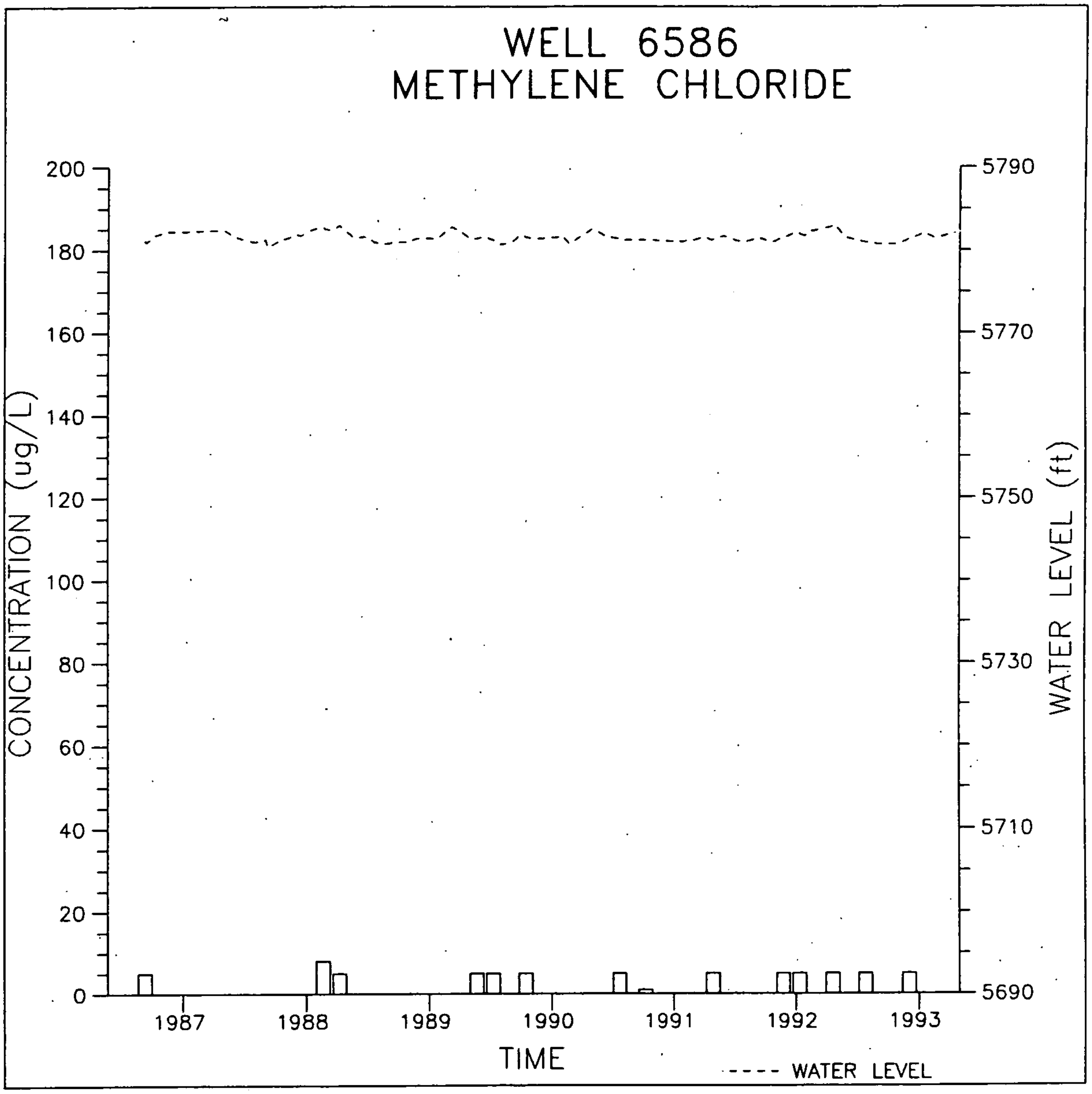
~~586~~



WELL 6486
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5840
5820
5800
5780
5760
5740
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

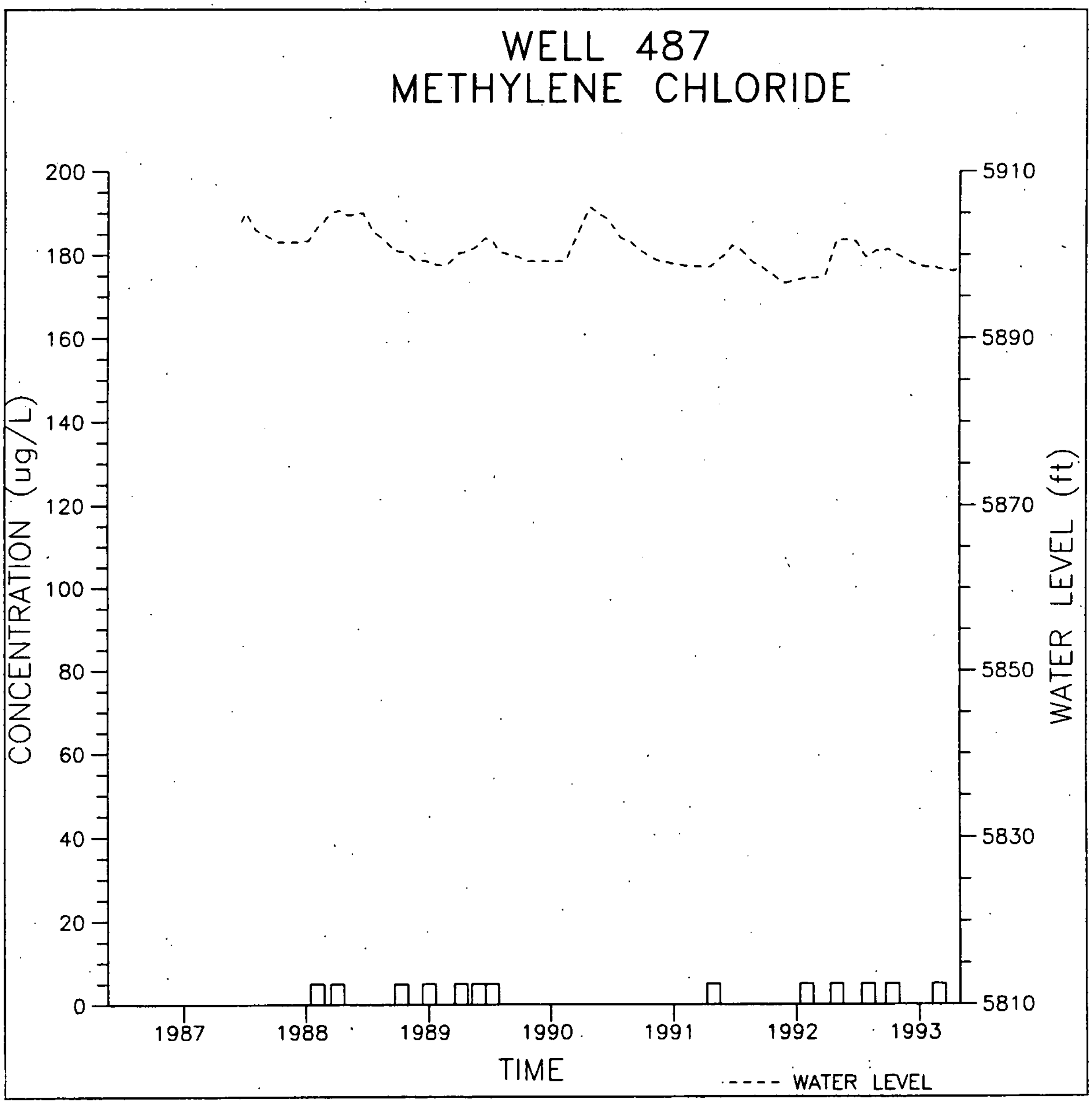
586

587


WELL 6586
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

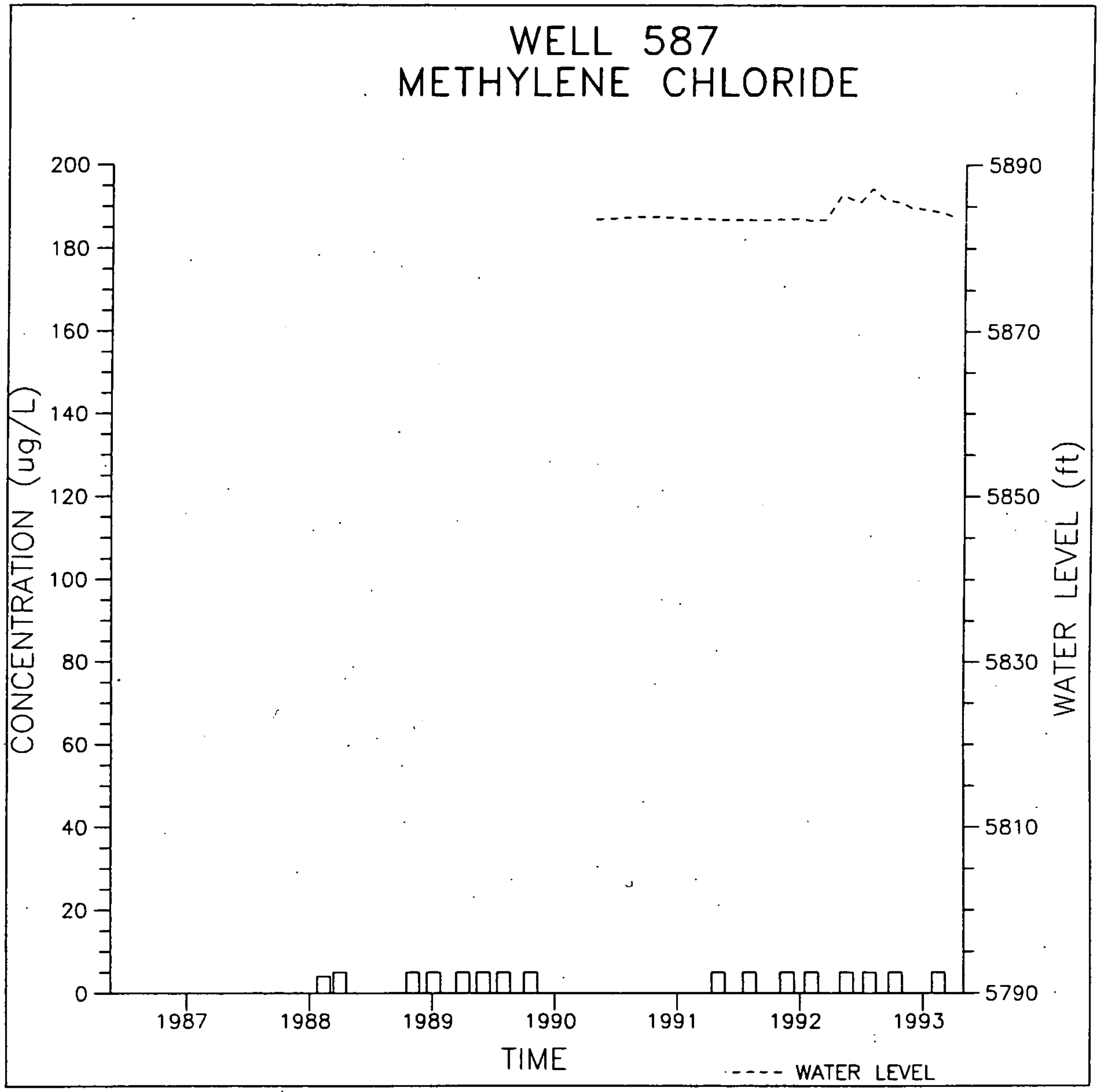
587

588


WELL 487
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

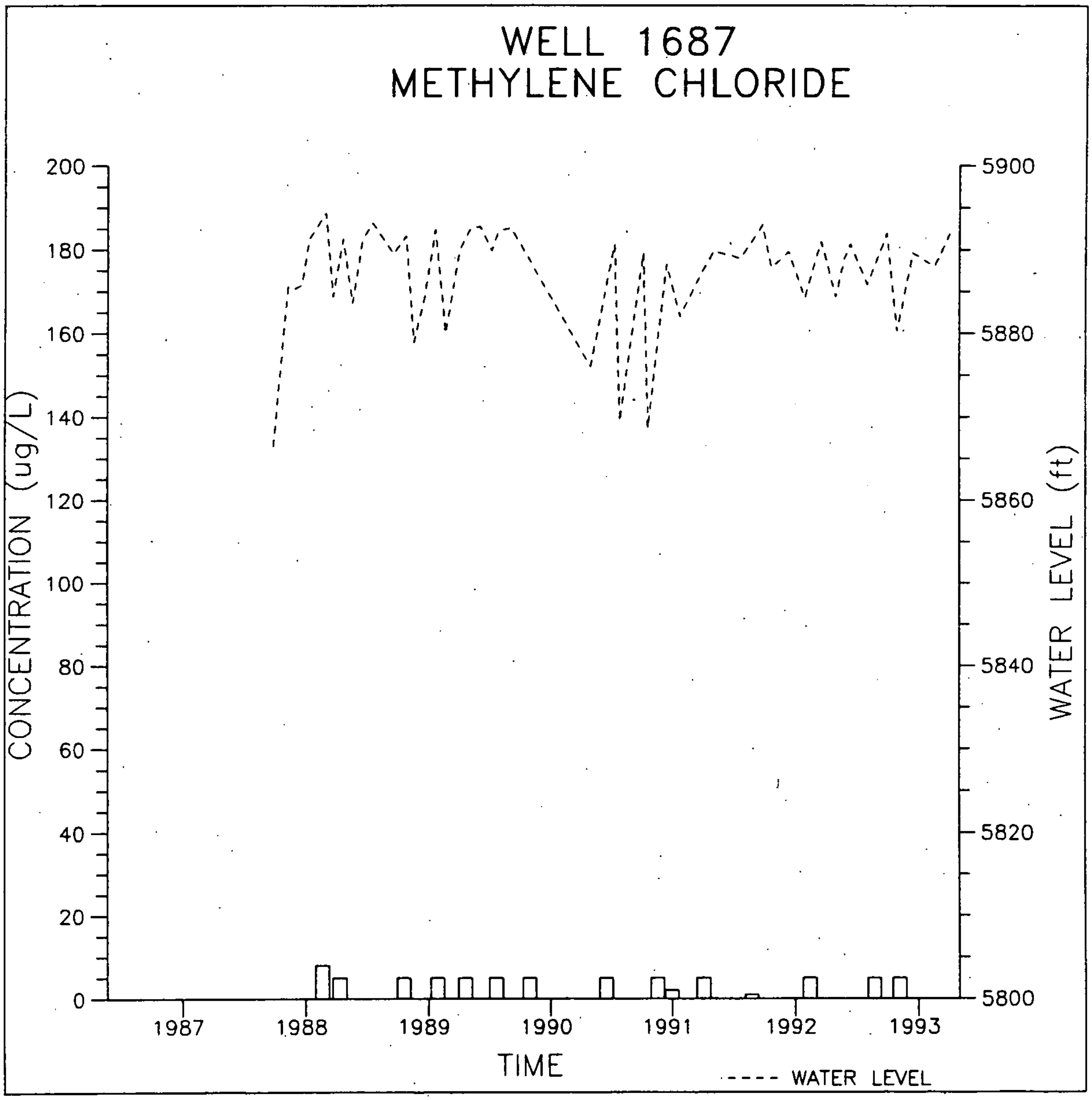
588

589


WELL 587
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

589

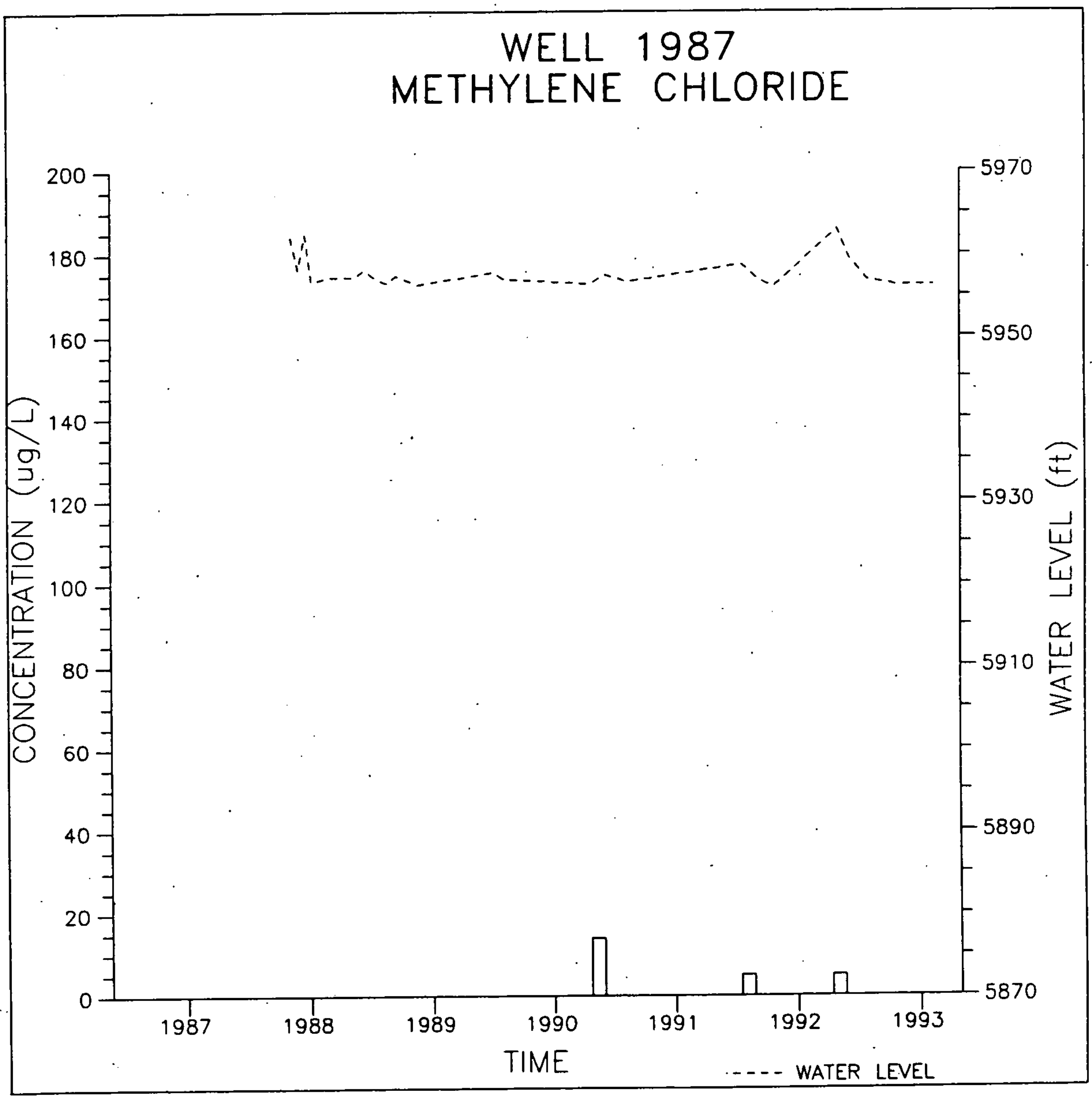
590



WELL 1687
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

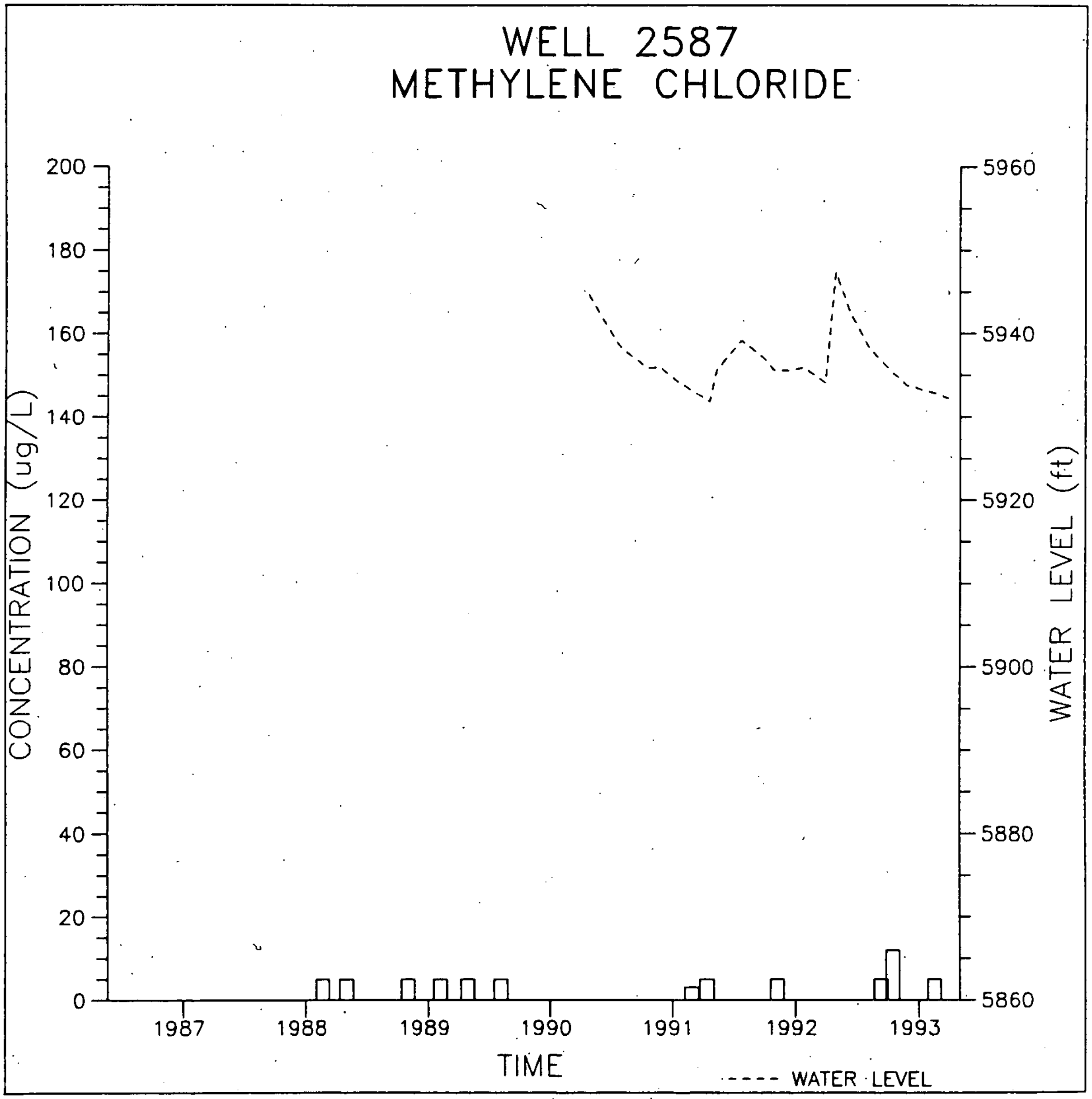
590

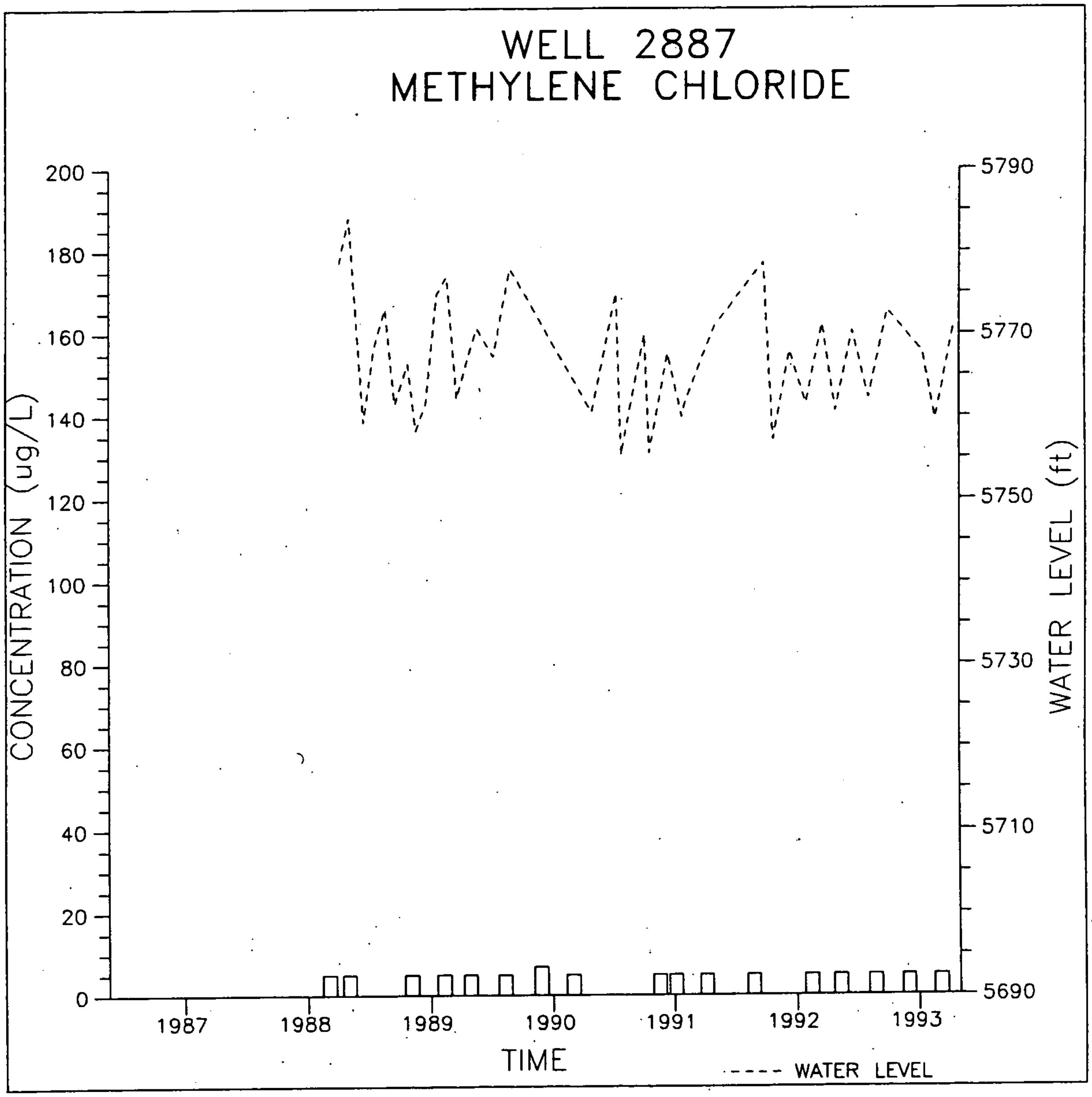
591


WELL 1987
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5870
5890
5910
5930
5950
5970
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

591

597

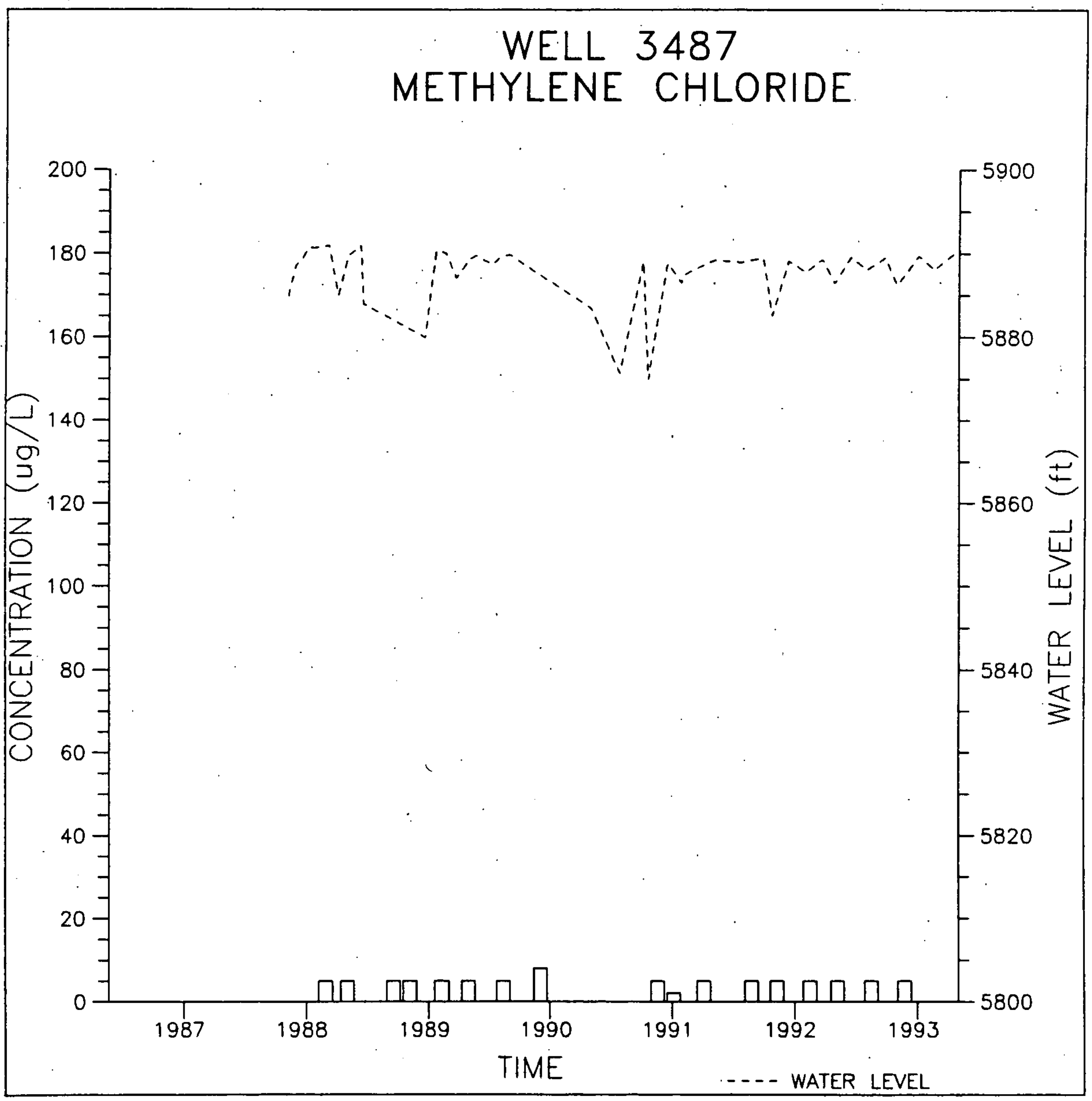

WELL 2587
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993



WELL 2887
METHYLENE CHLORIDE
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5790
5770
5750
5730
5710
5690
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

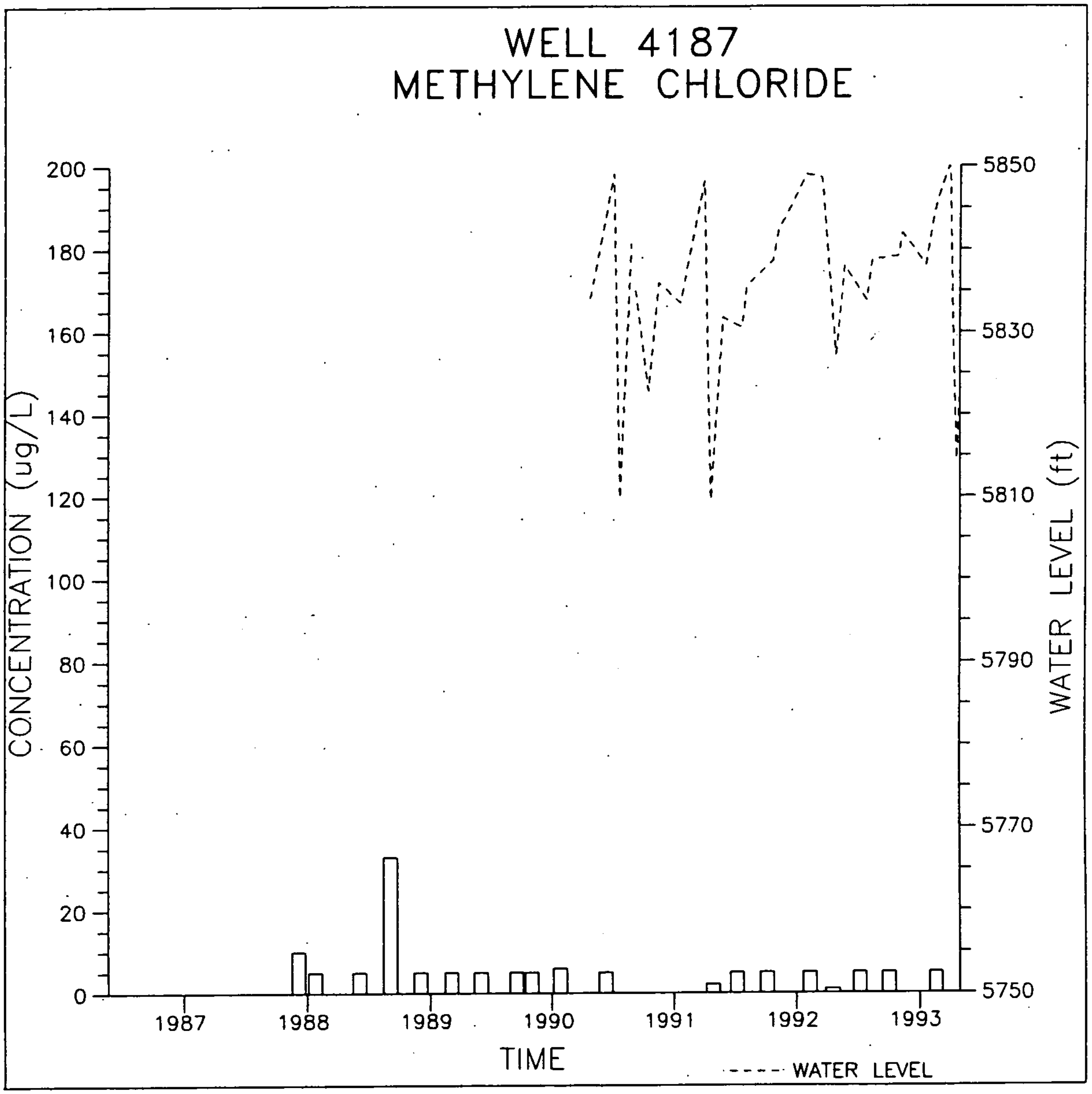
593

594


WELL 3487
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

594

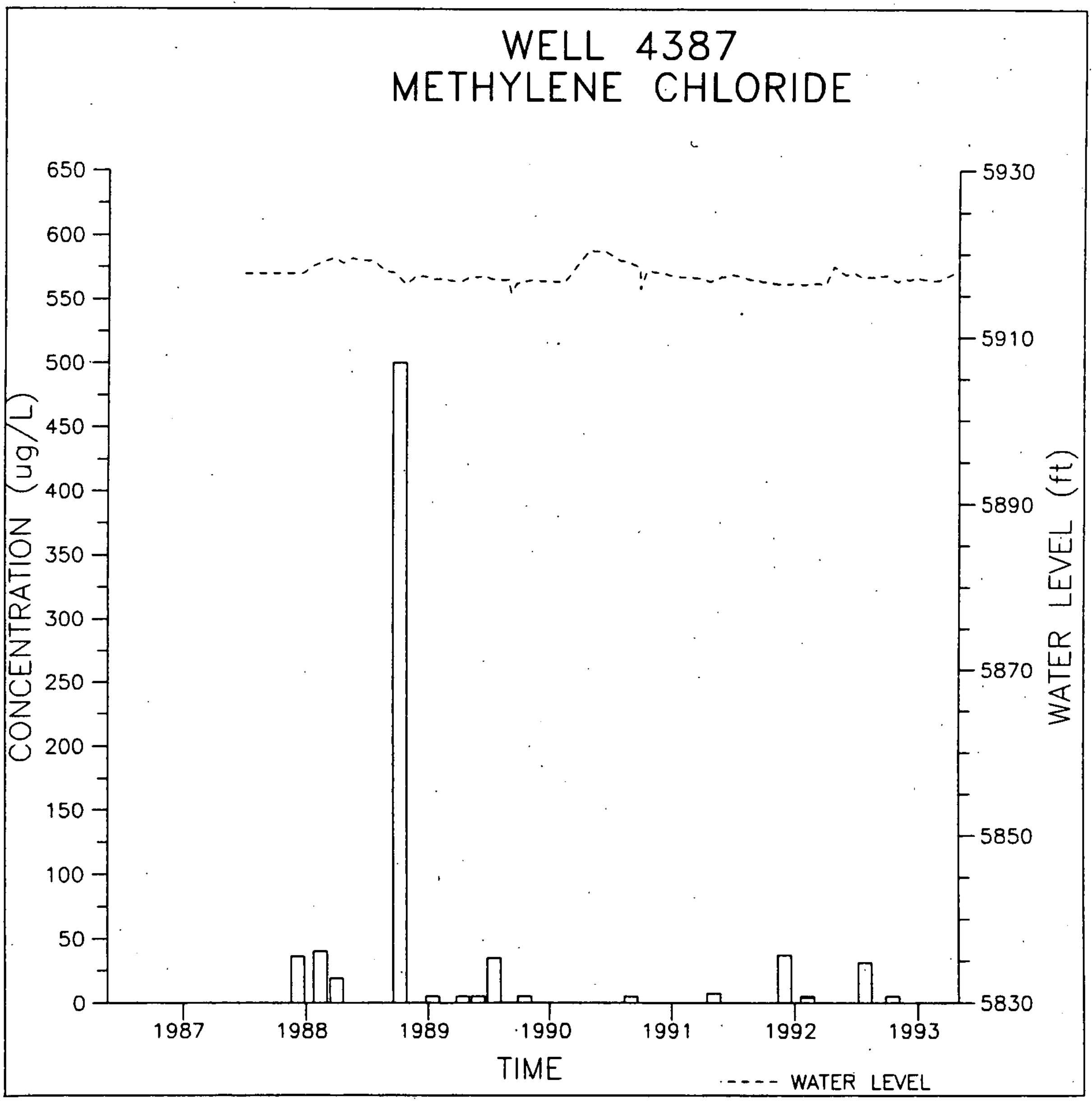
595



WELL 4187
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

595

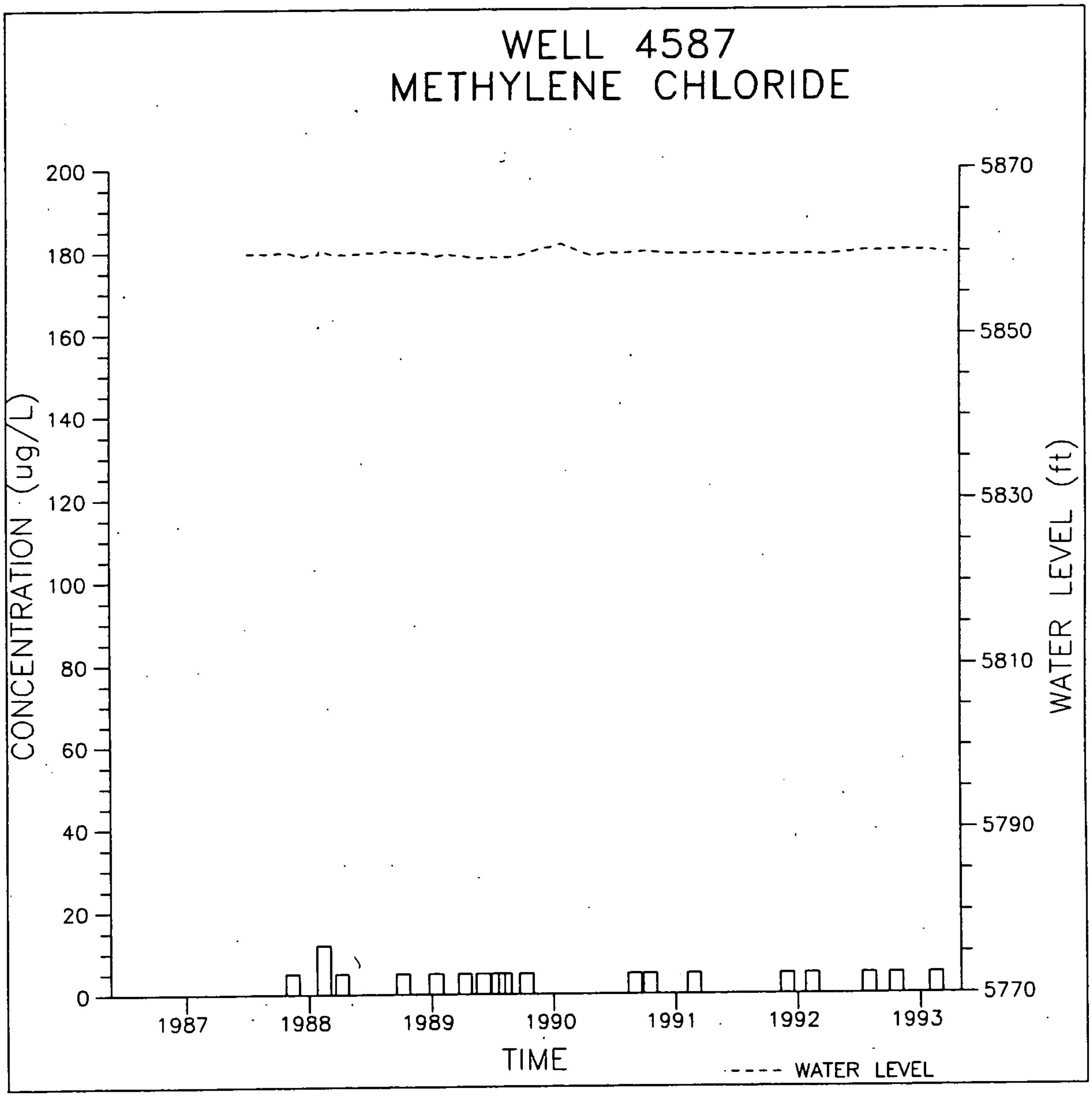
5948



WELL 4387
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
650
600
550
500
450
400
350
300
250
200
150
100
50
0
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

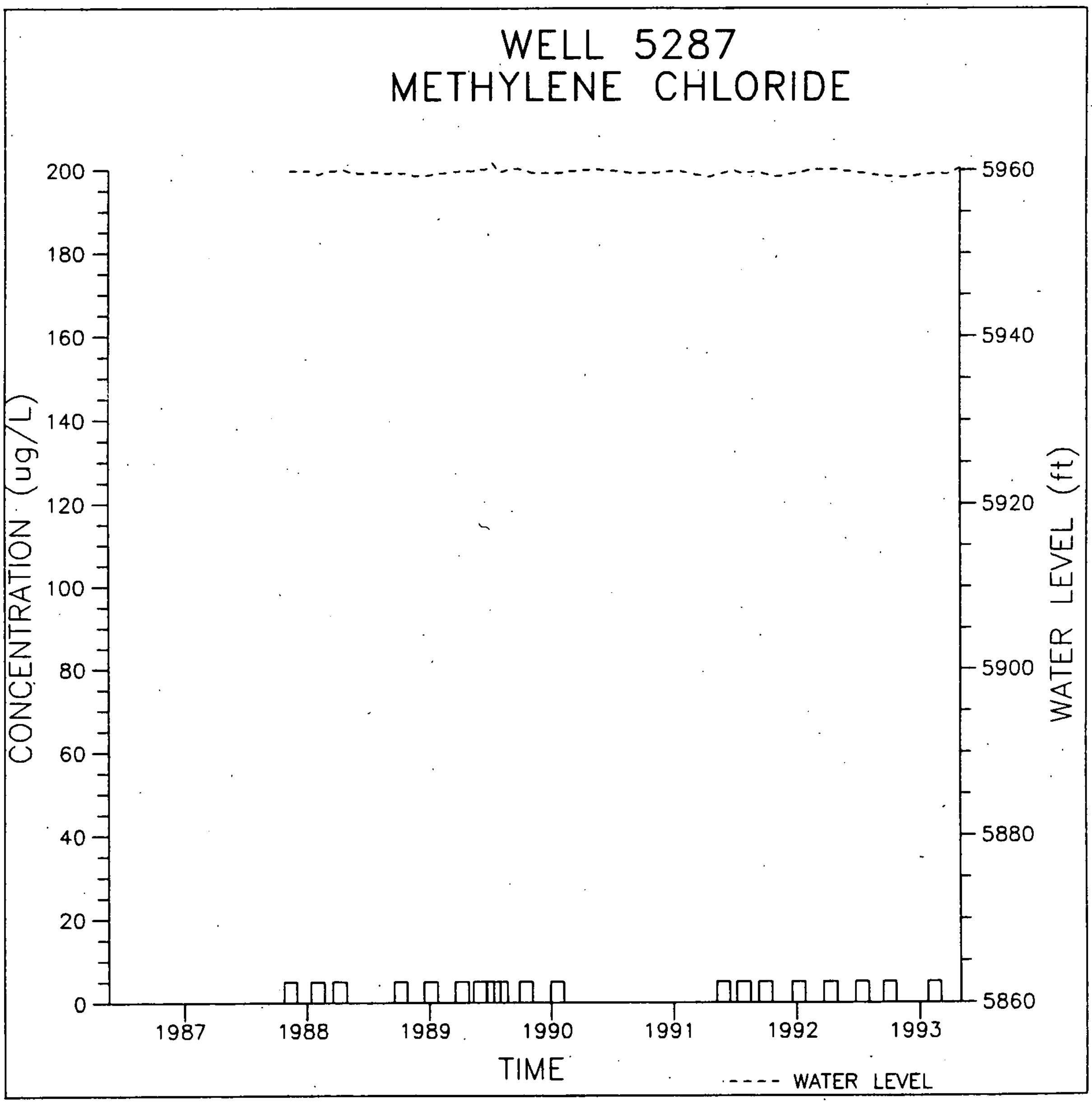
596

597


WELL 4587
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

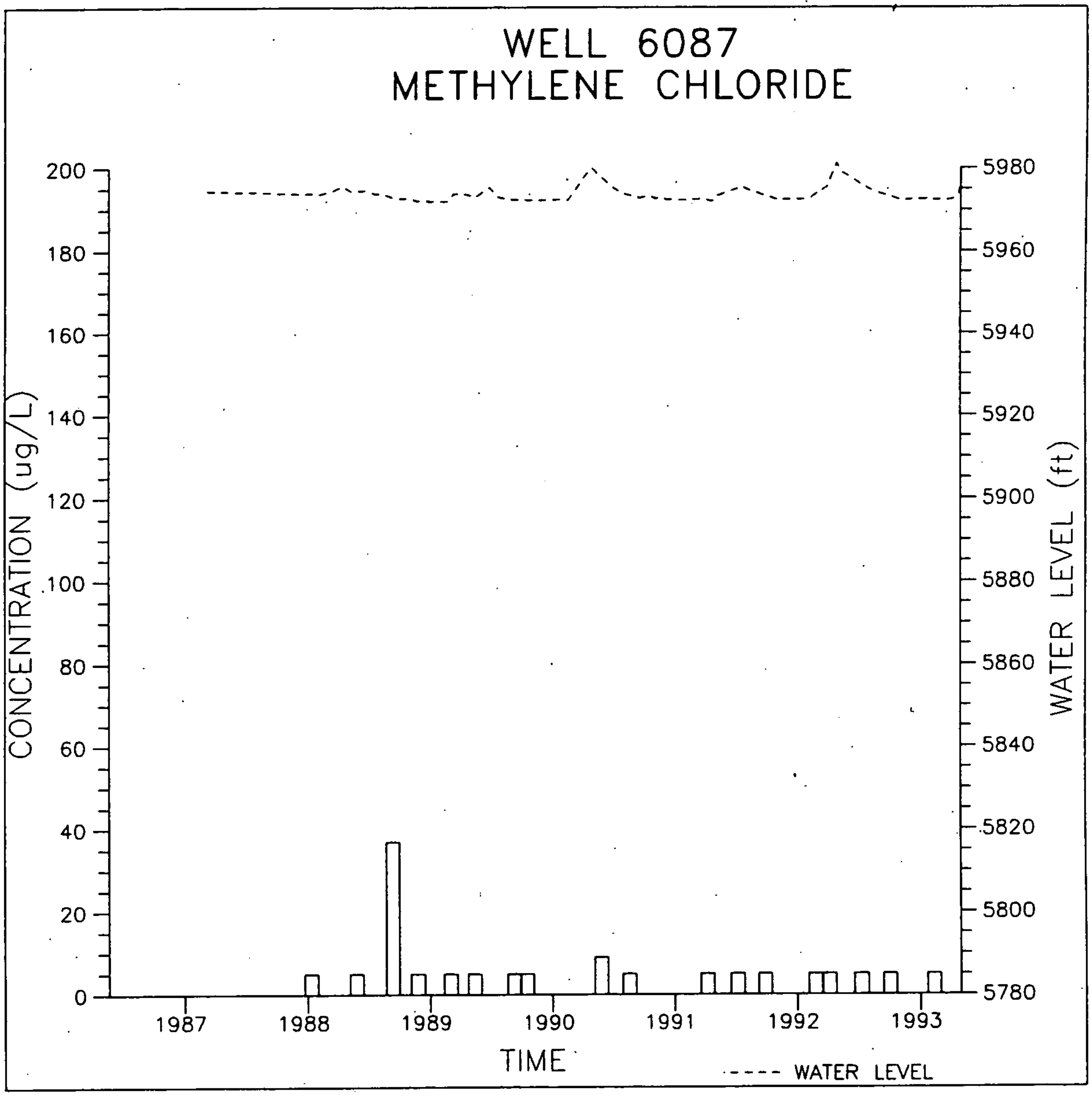
597

598


WELL 5287
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

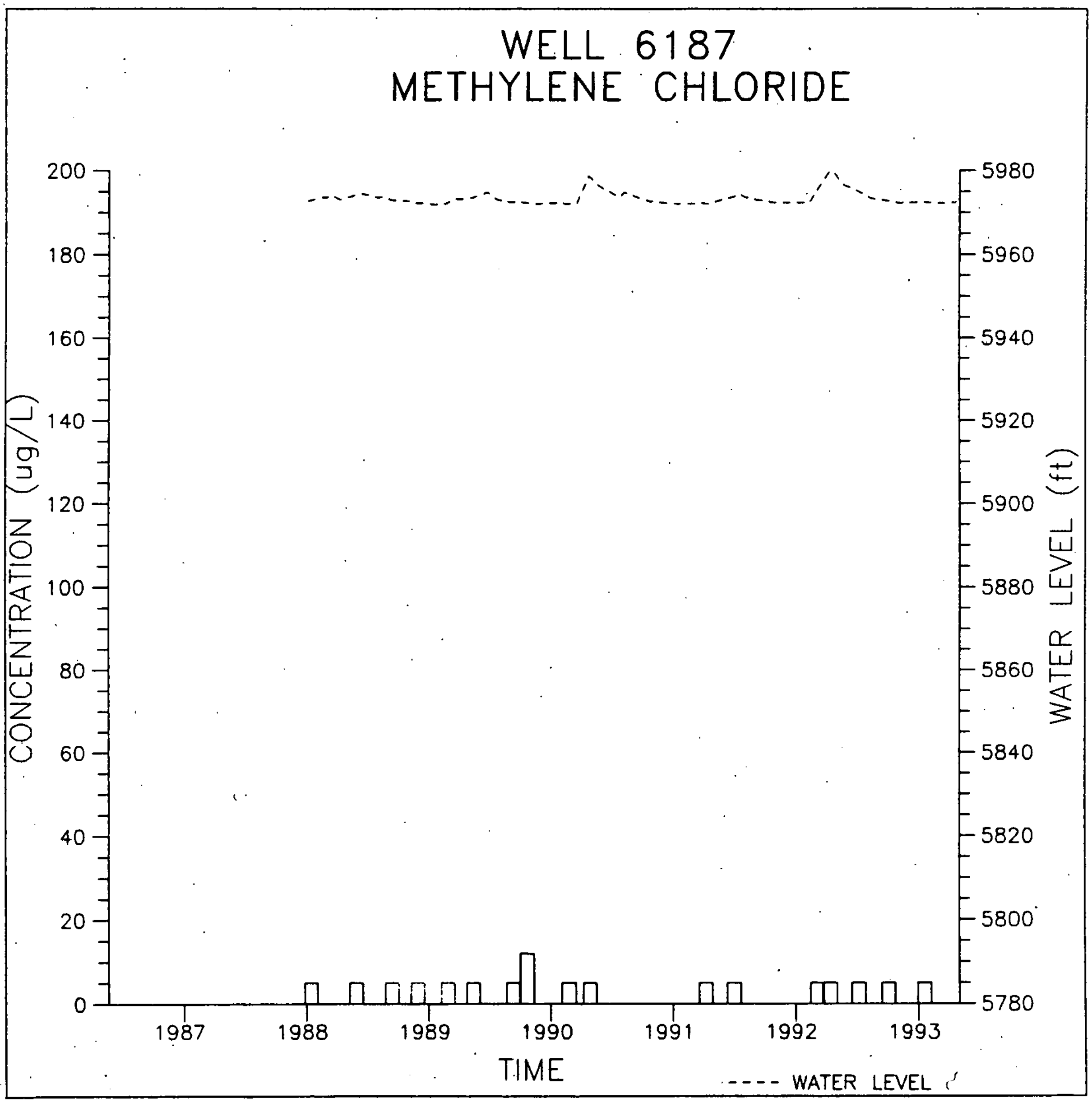
598

599

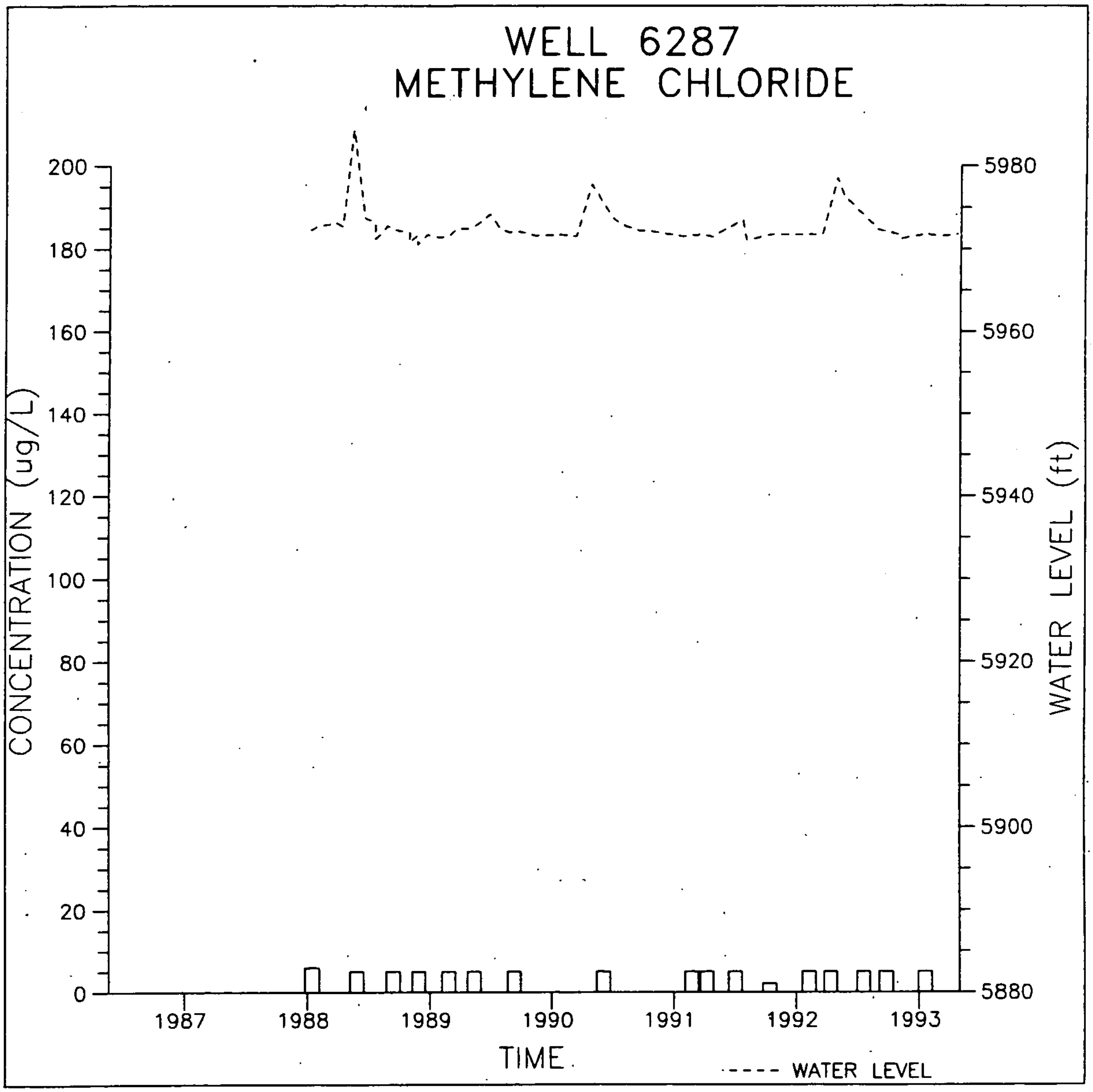


WELL 6087
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

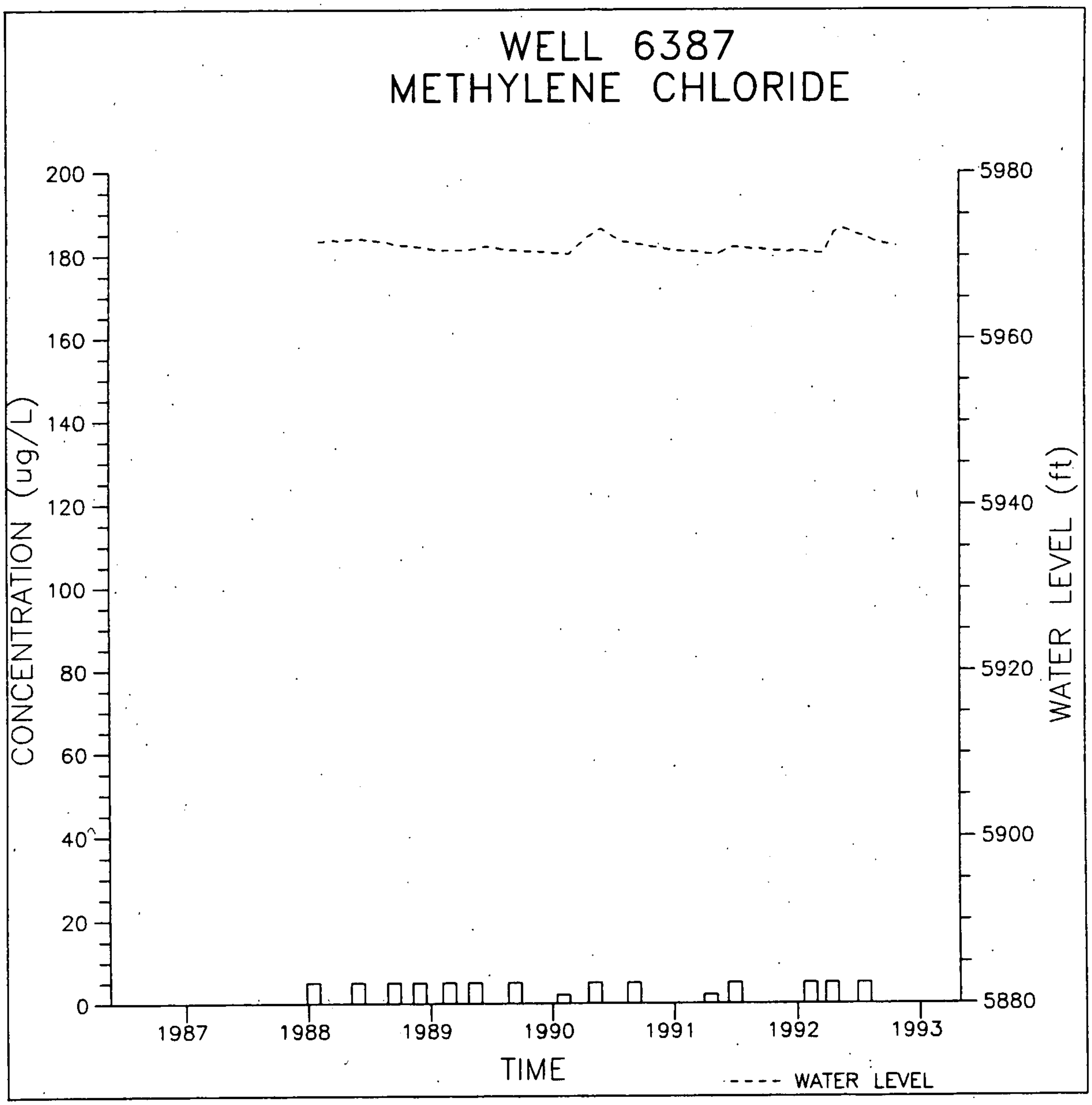
599


WELL 6187
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

600



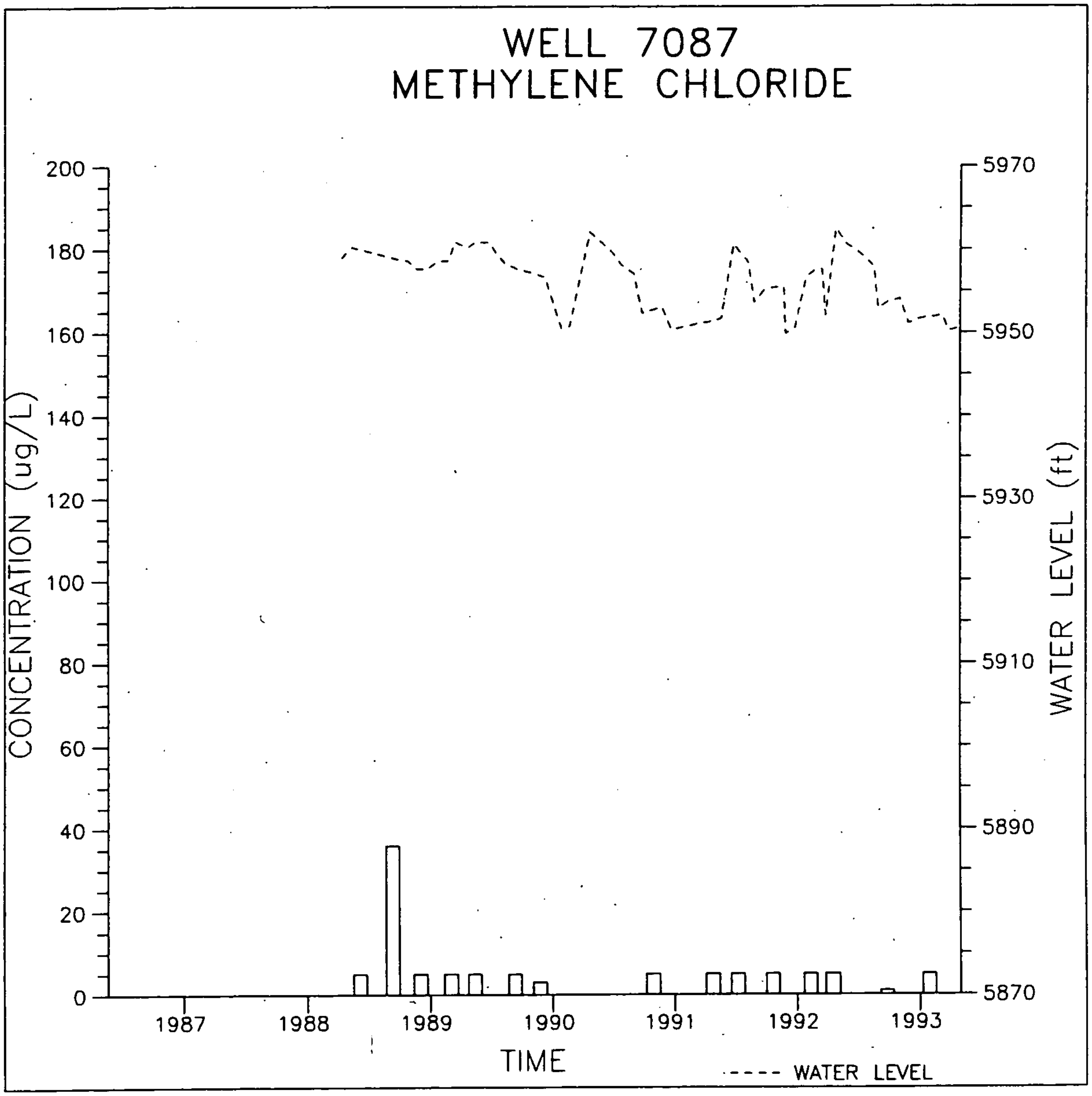
WELL 6287
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



WELL 6387
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

602

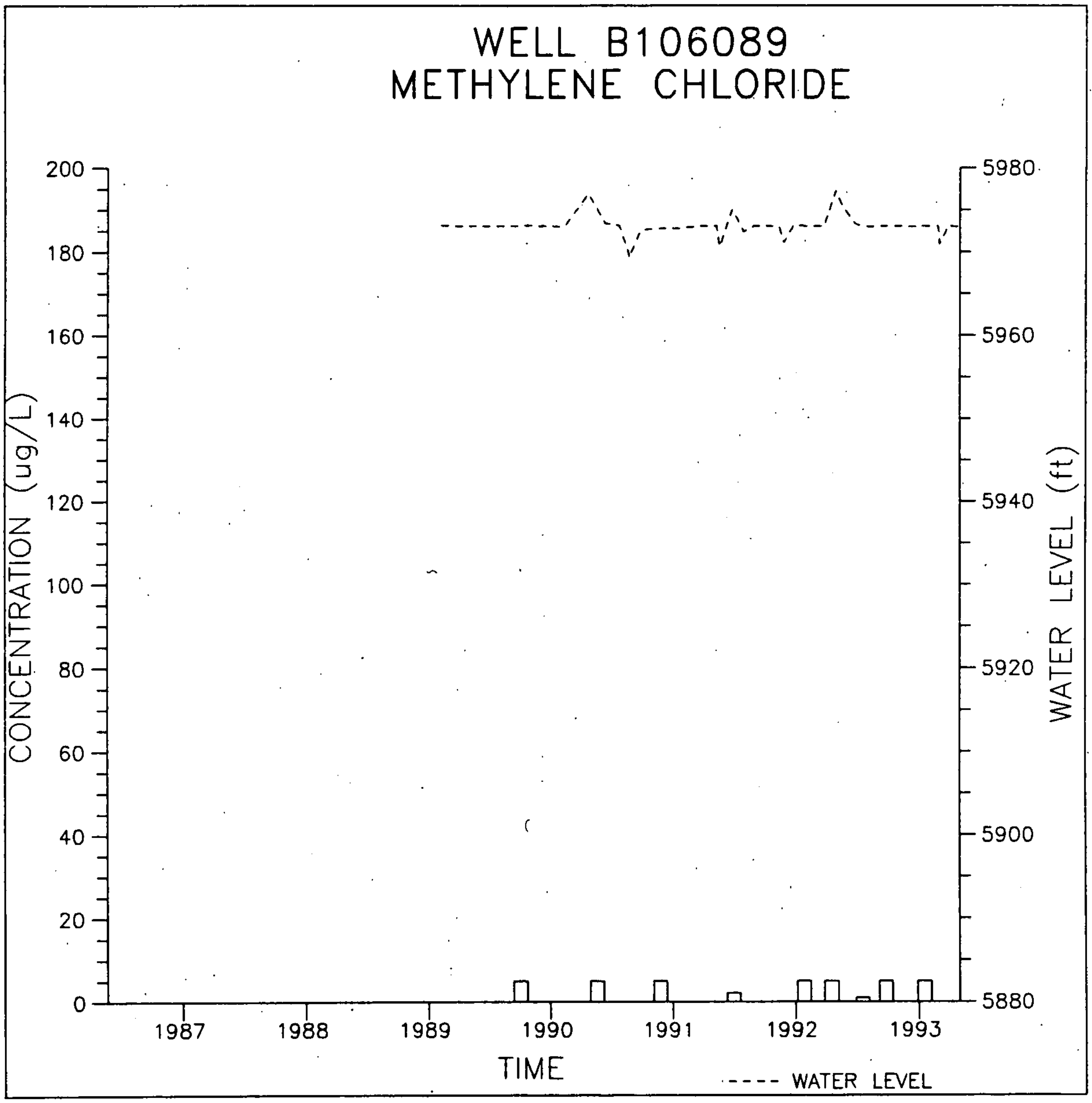
603



WELL 7087
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

603

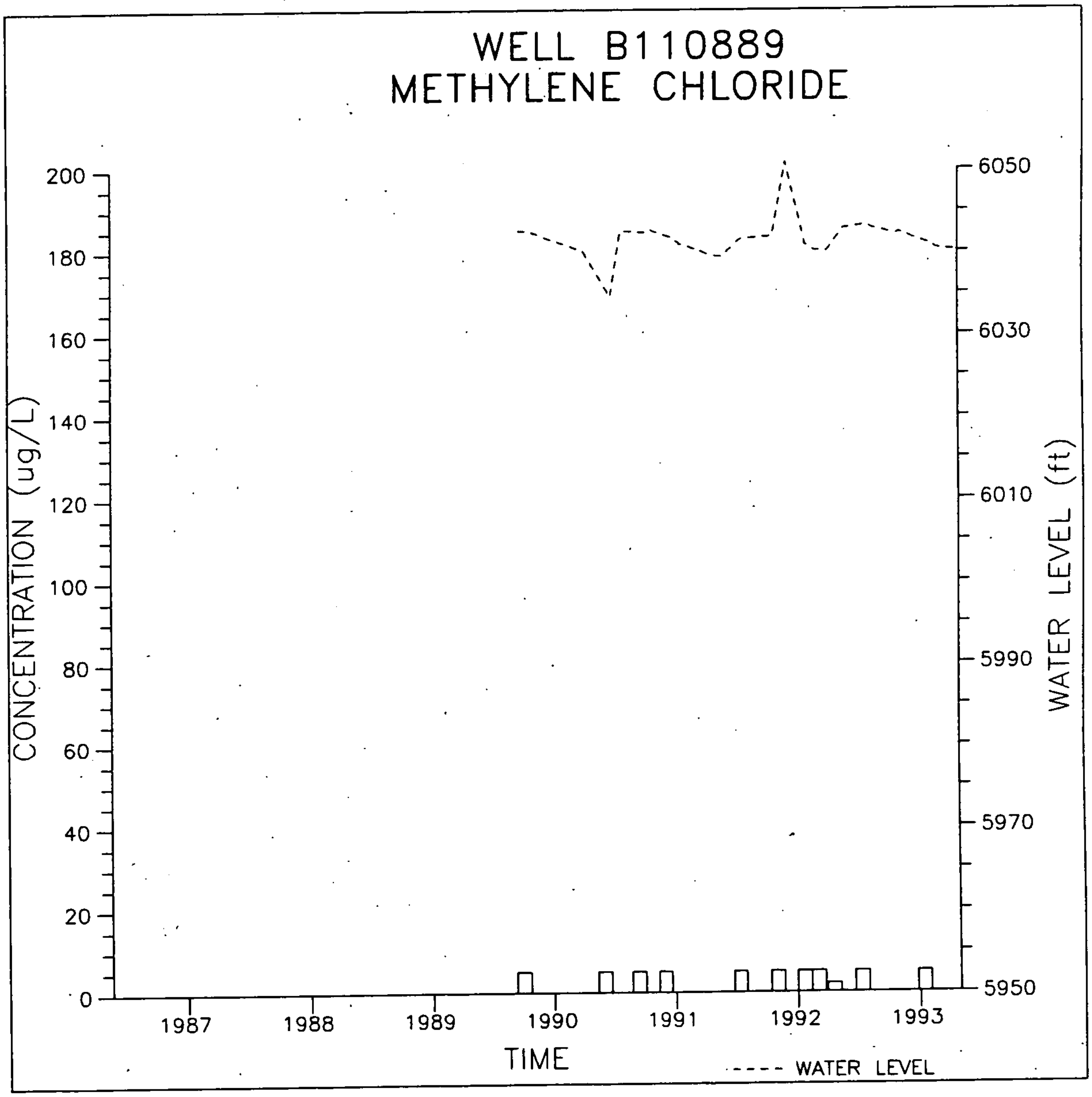
604



WELL B106089
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

604

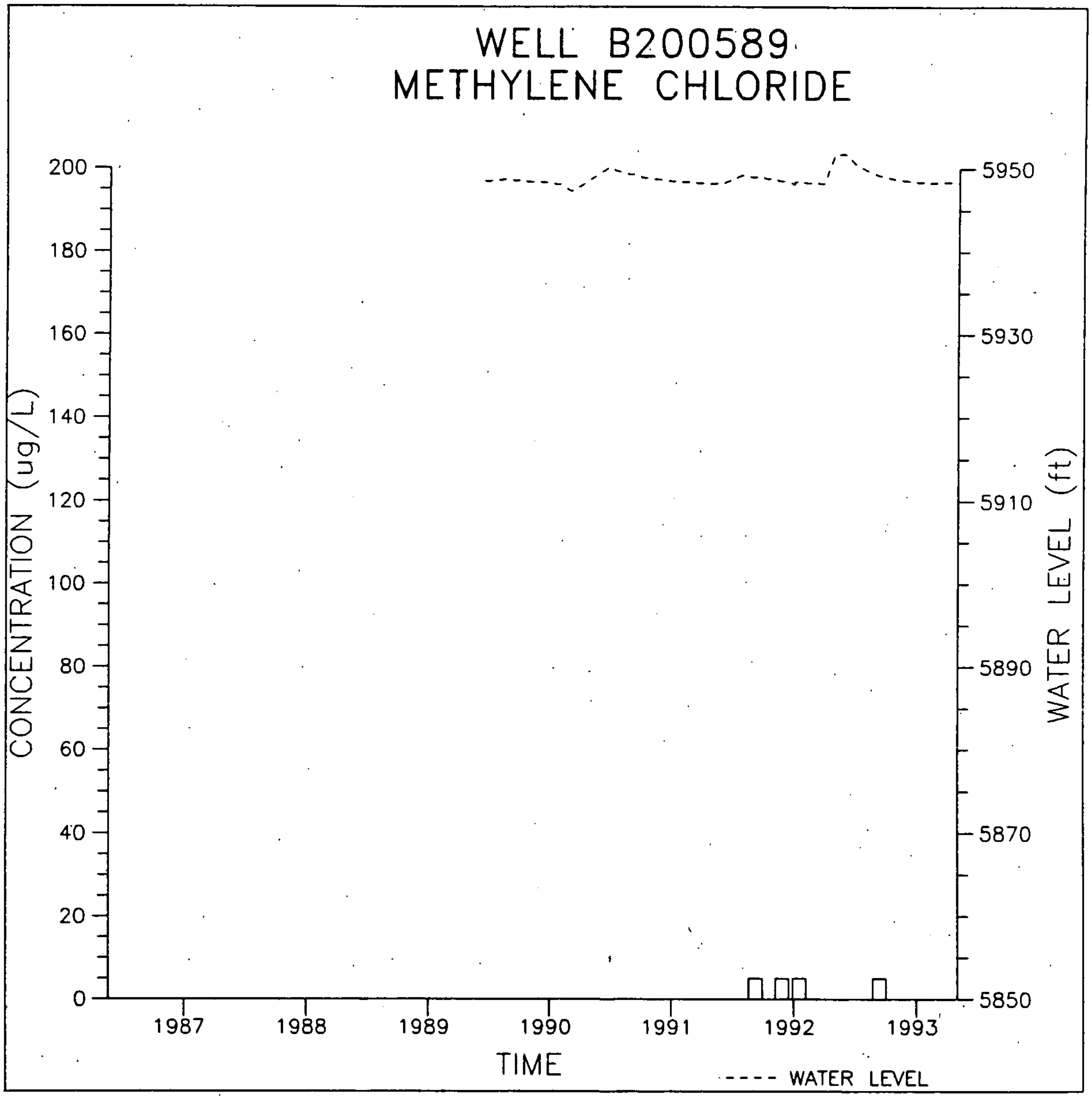
605



WELL B110889
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6050
6030
6010
5990
5970
5950
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

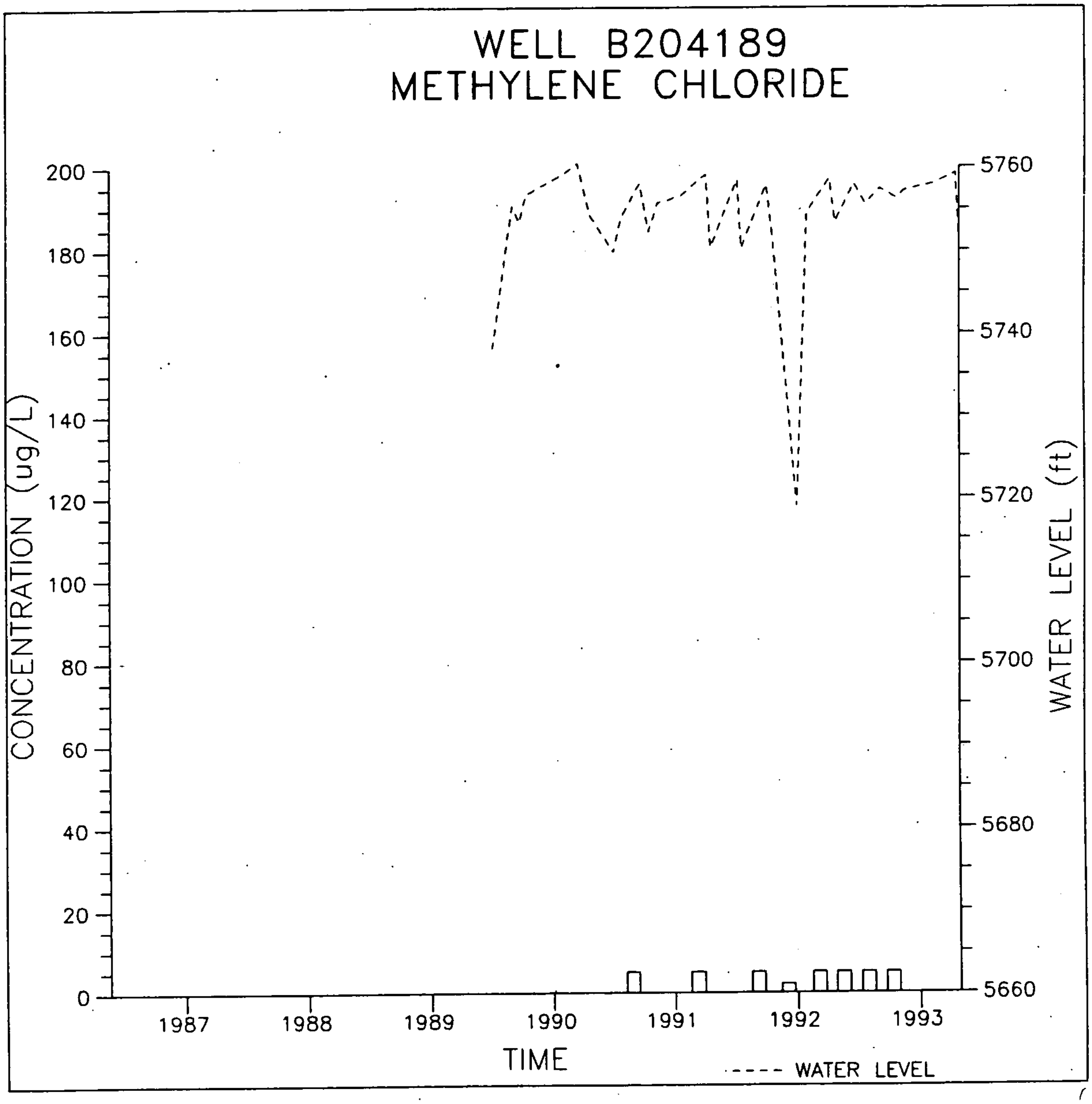
605

606



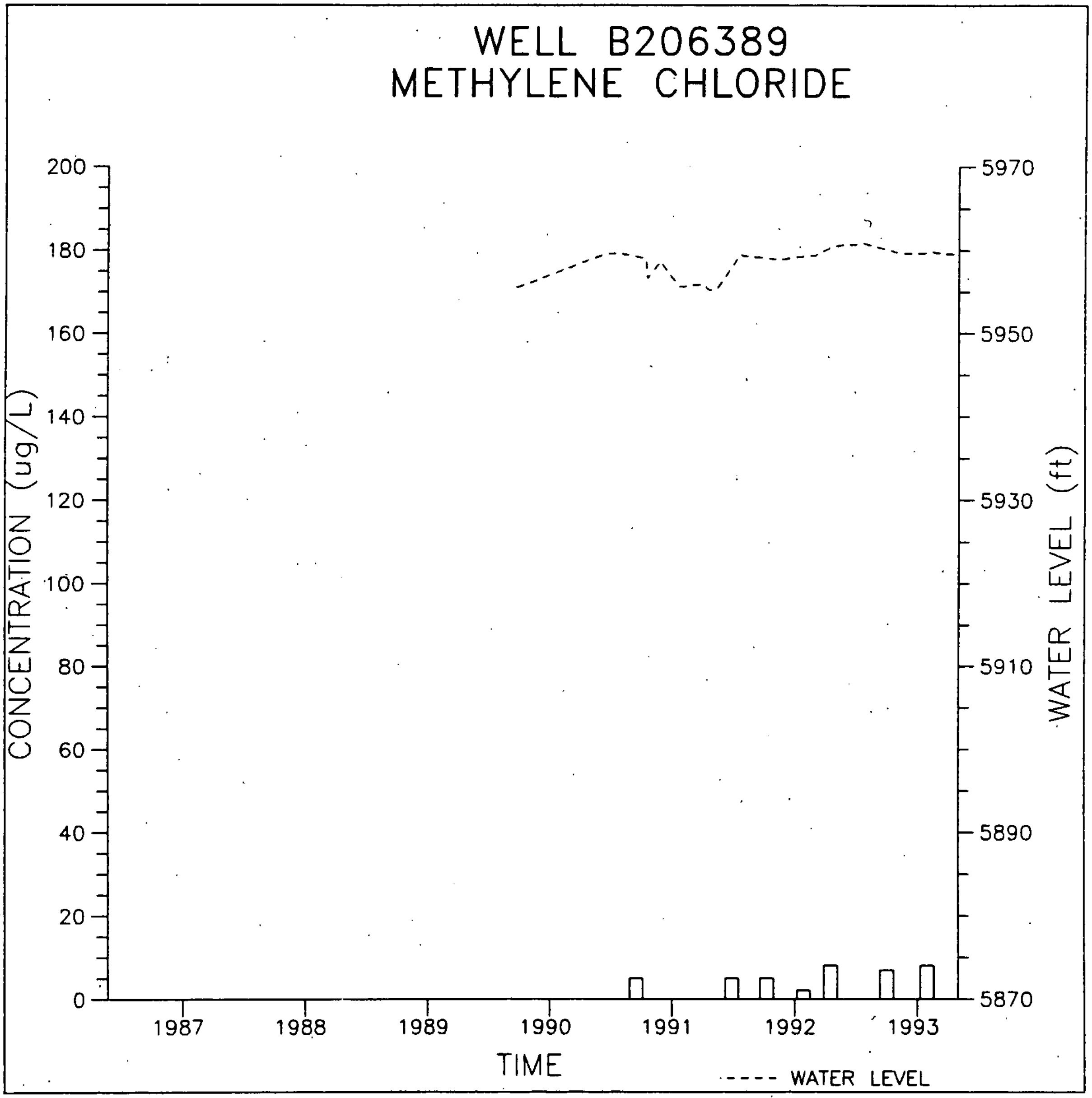
WELL B200589
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

606



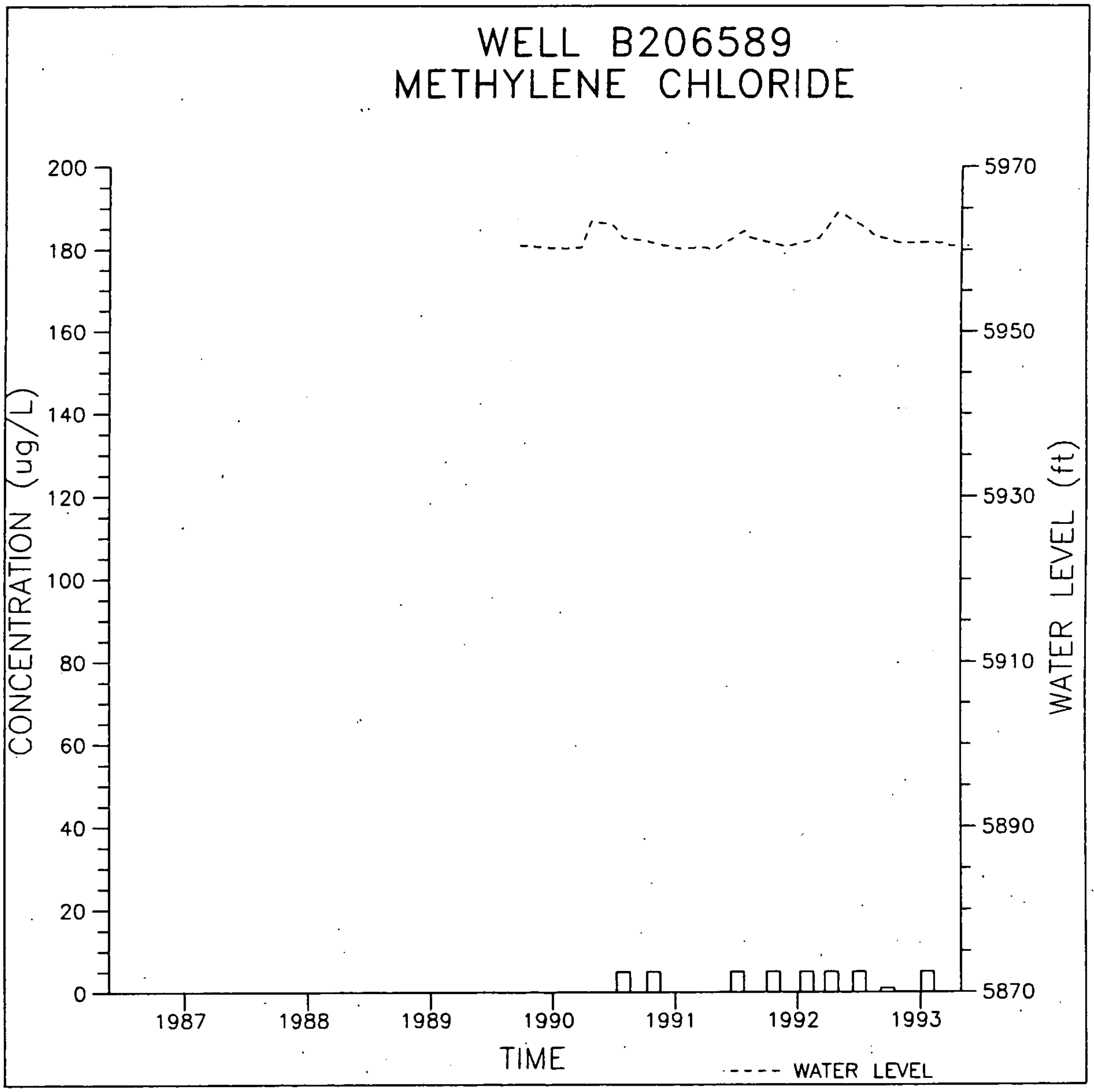
WELL B204189
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5760
5740
5720
5700
5680
5660
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

607


WELL B206389
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

608

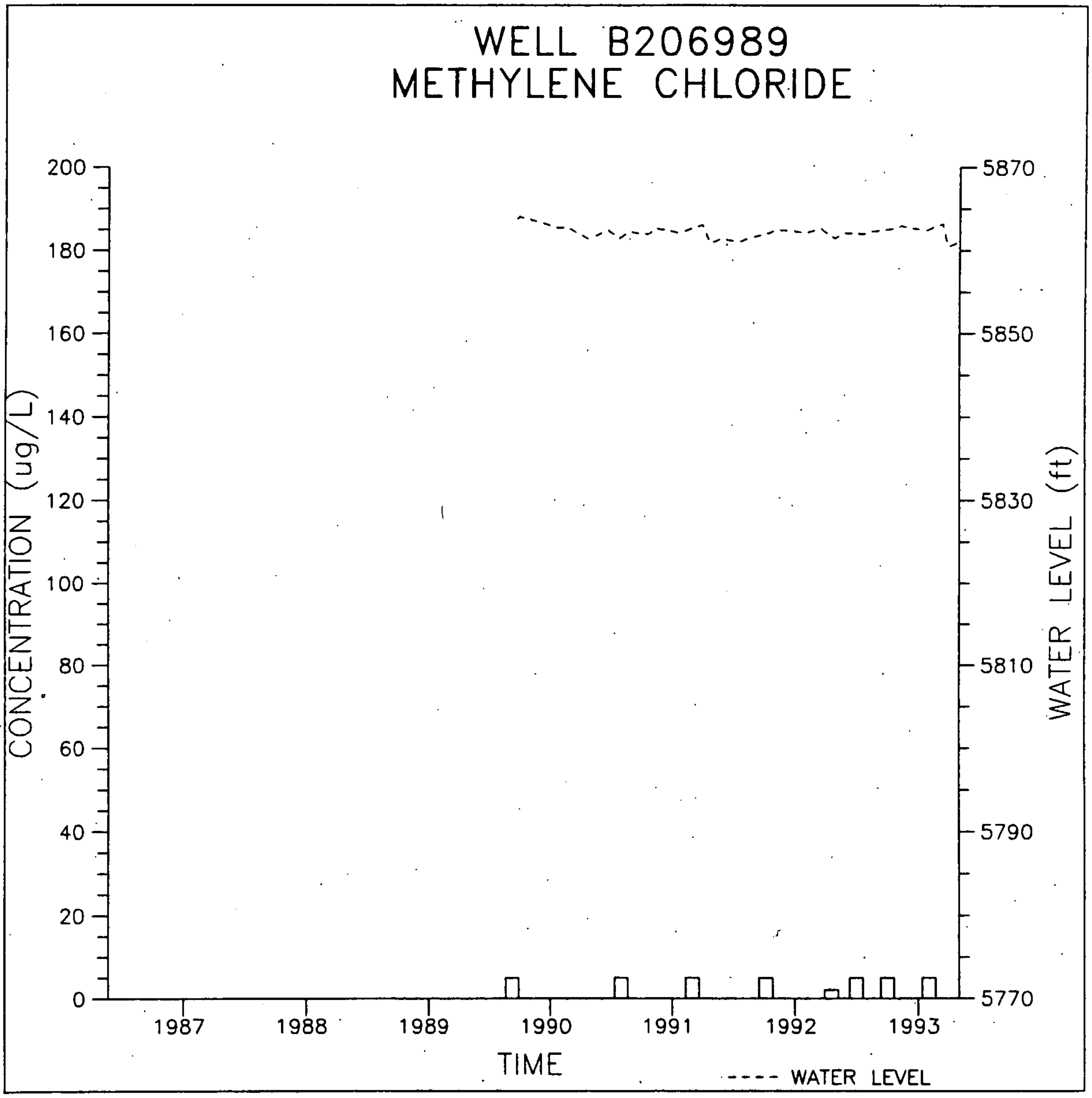
609



WELL B206589
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

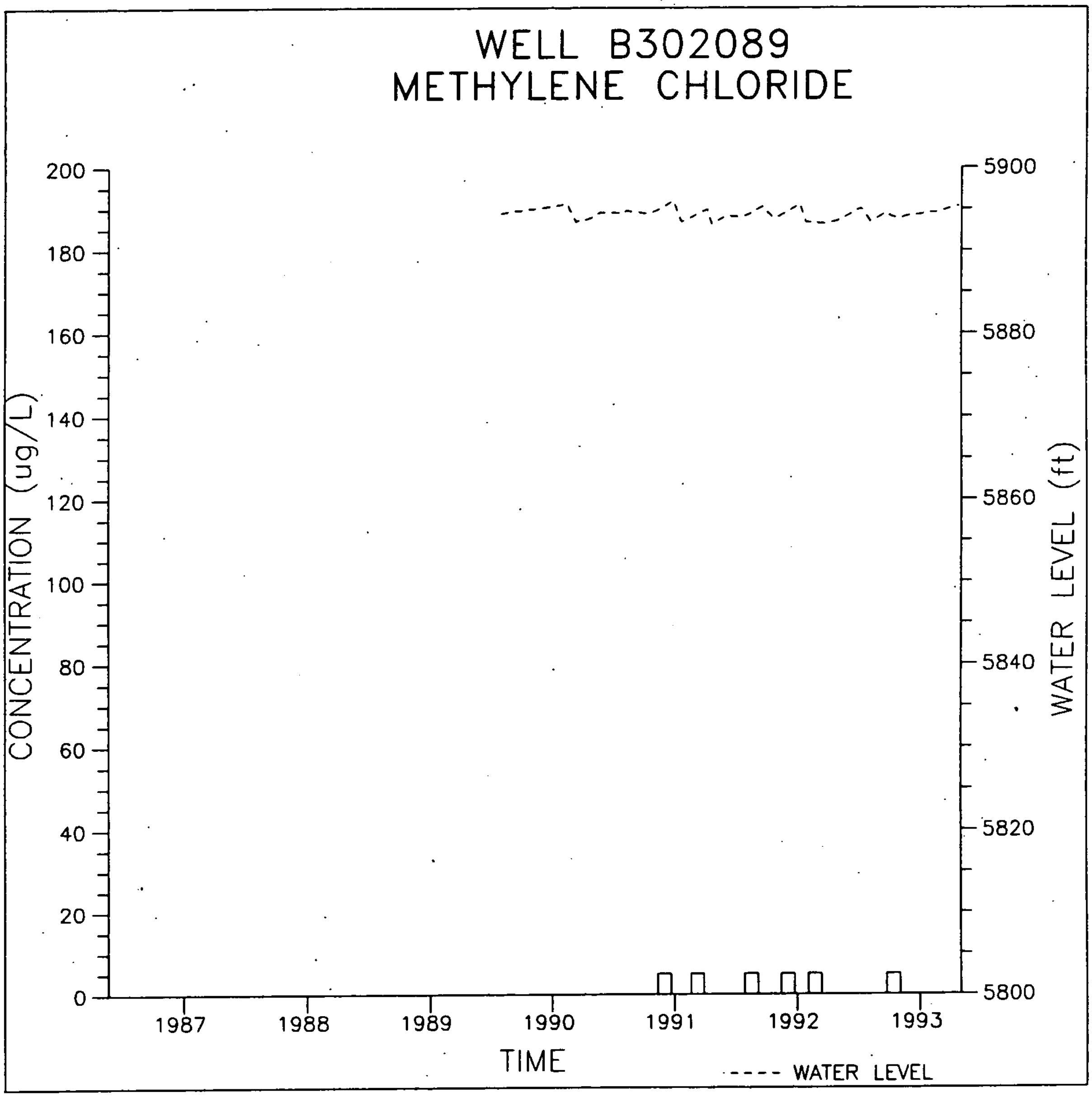
609

~~610~~



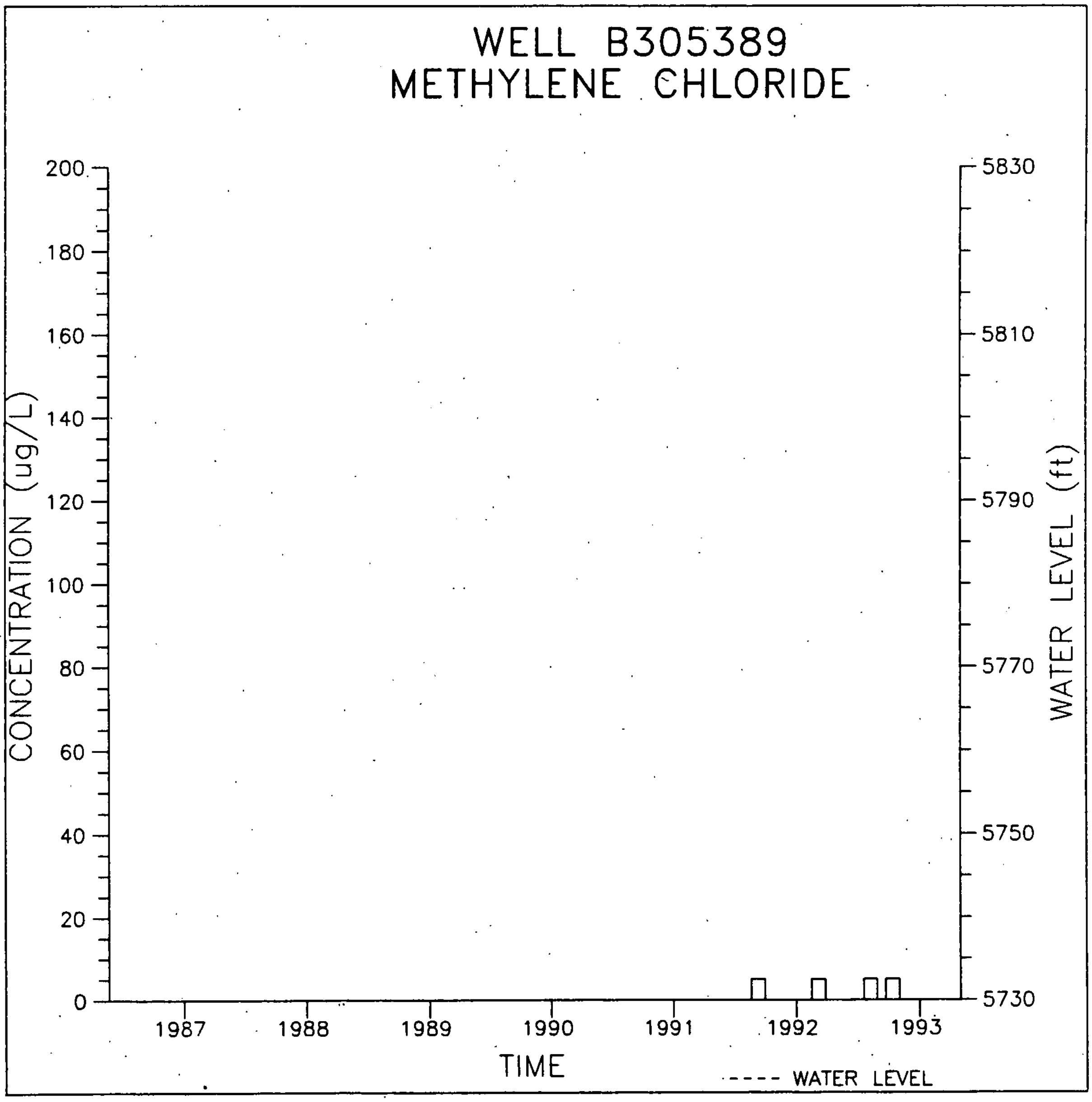
WELL B206989
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

610


WELL B302089
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

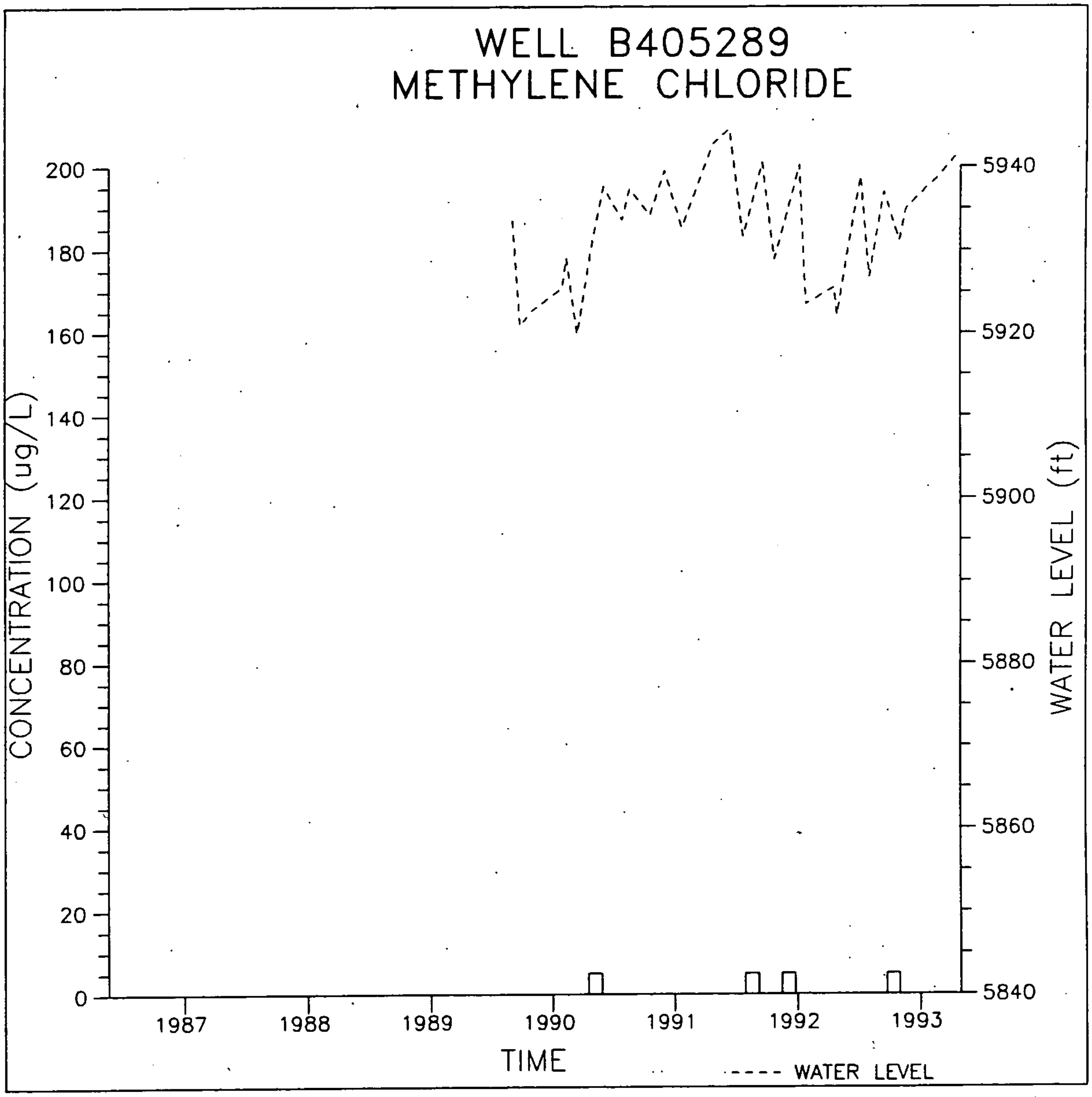
611

612



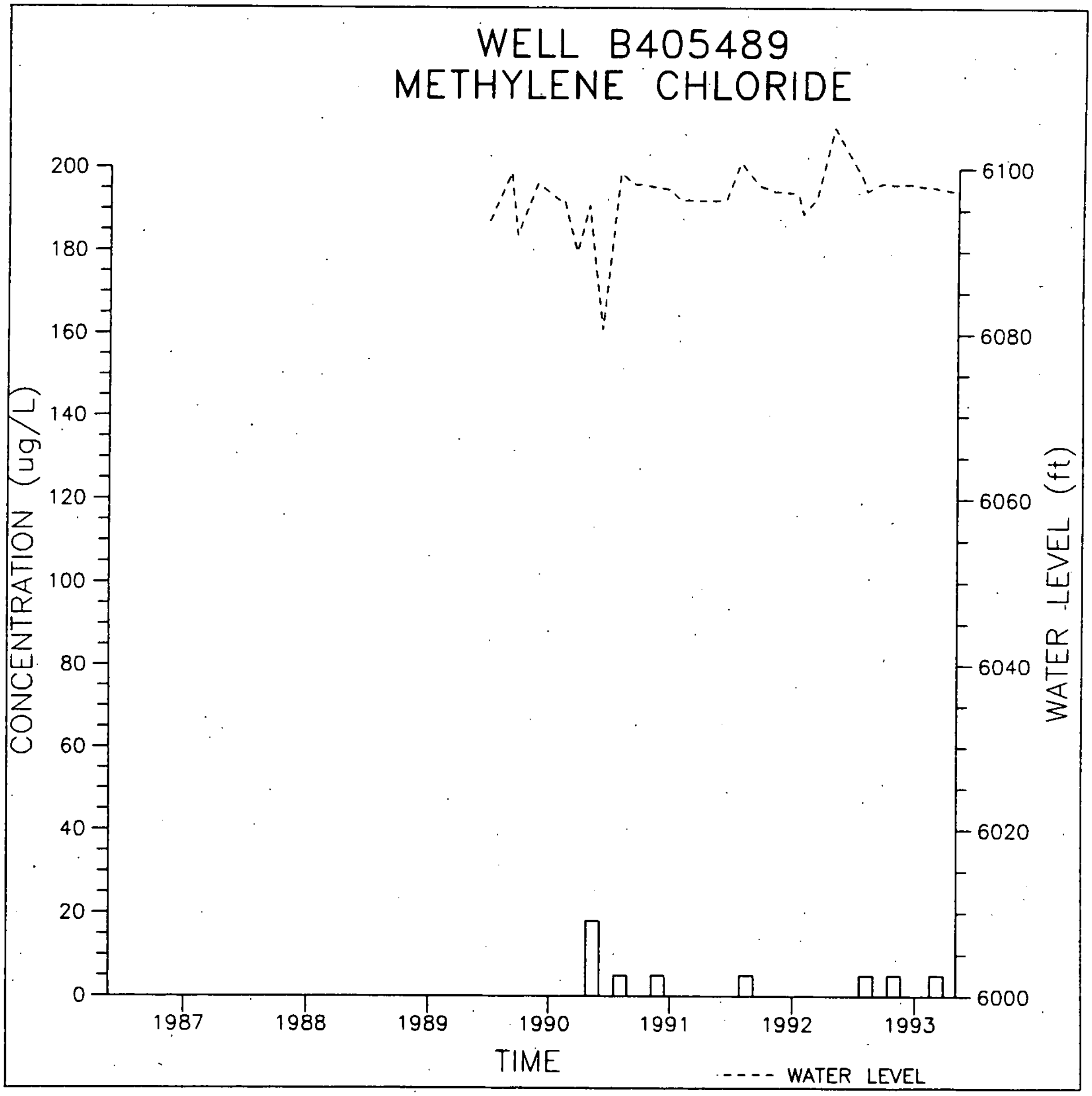
WELL B305389
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5830
5810
5790
5770
5750
5730
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

612


WELL B405289
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

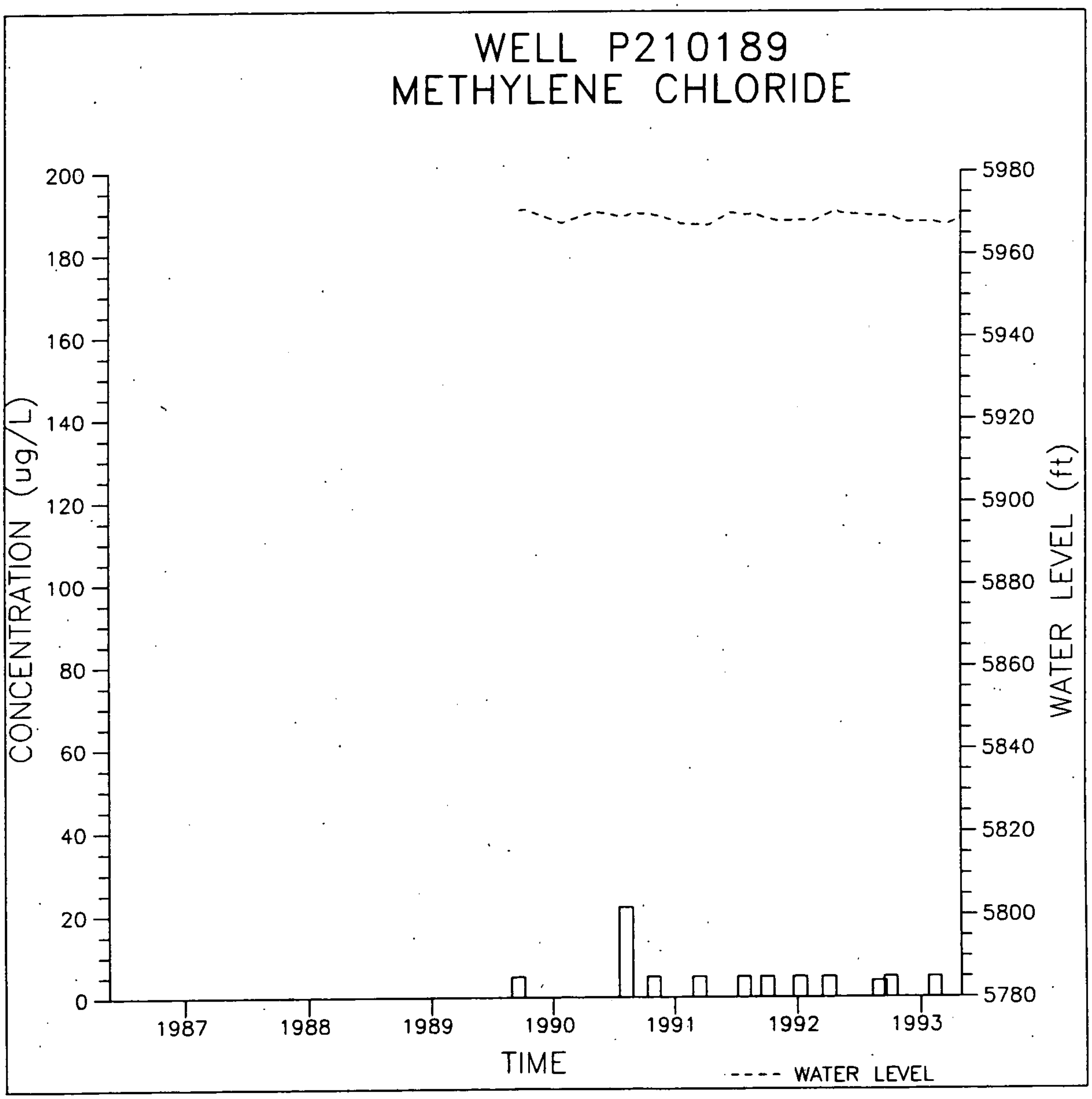
613

614

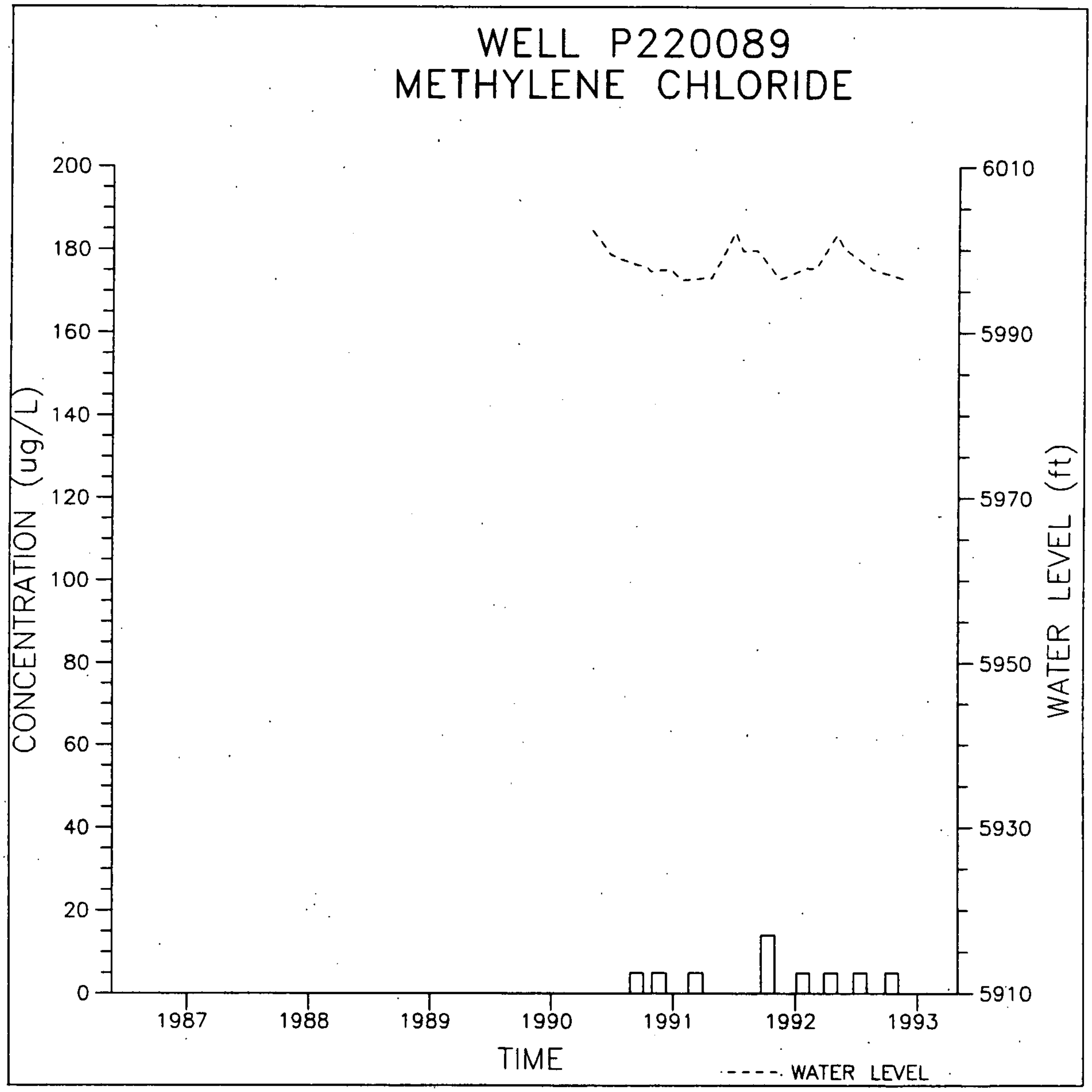


WELL B405489
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6100
6080
6060
6040
6020
6000
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

614

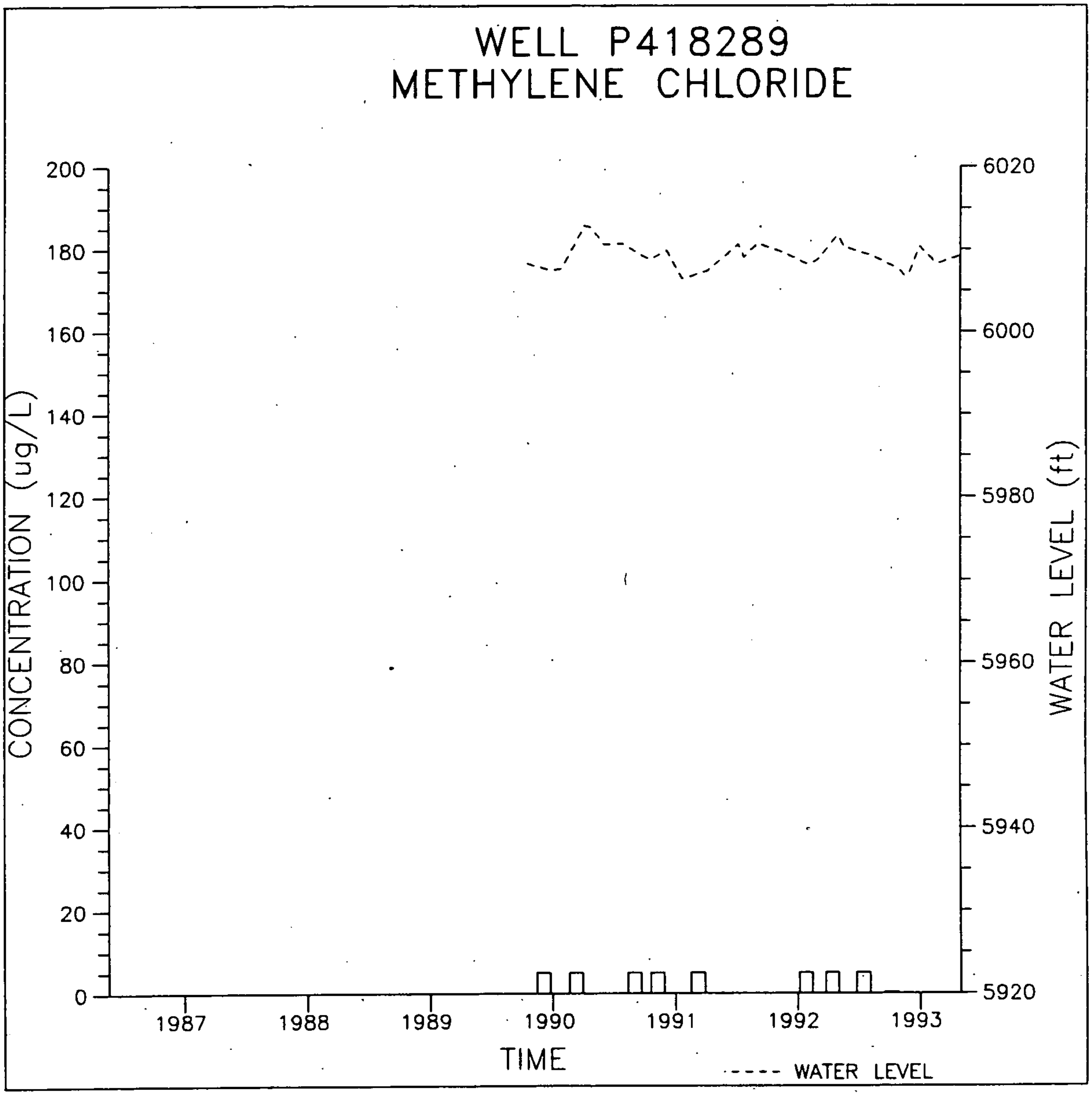

WELL P210189
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

615

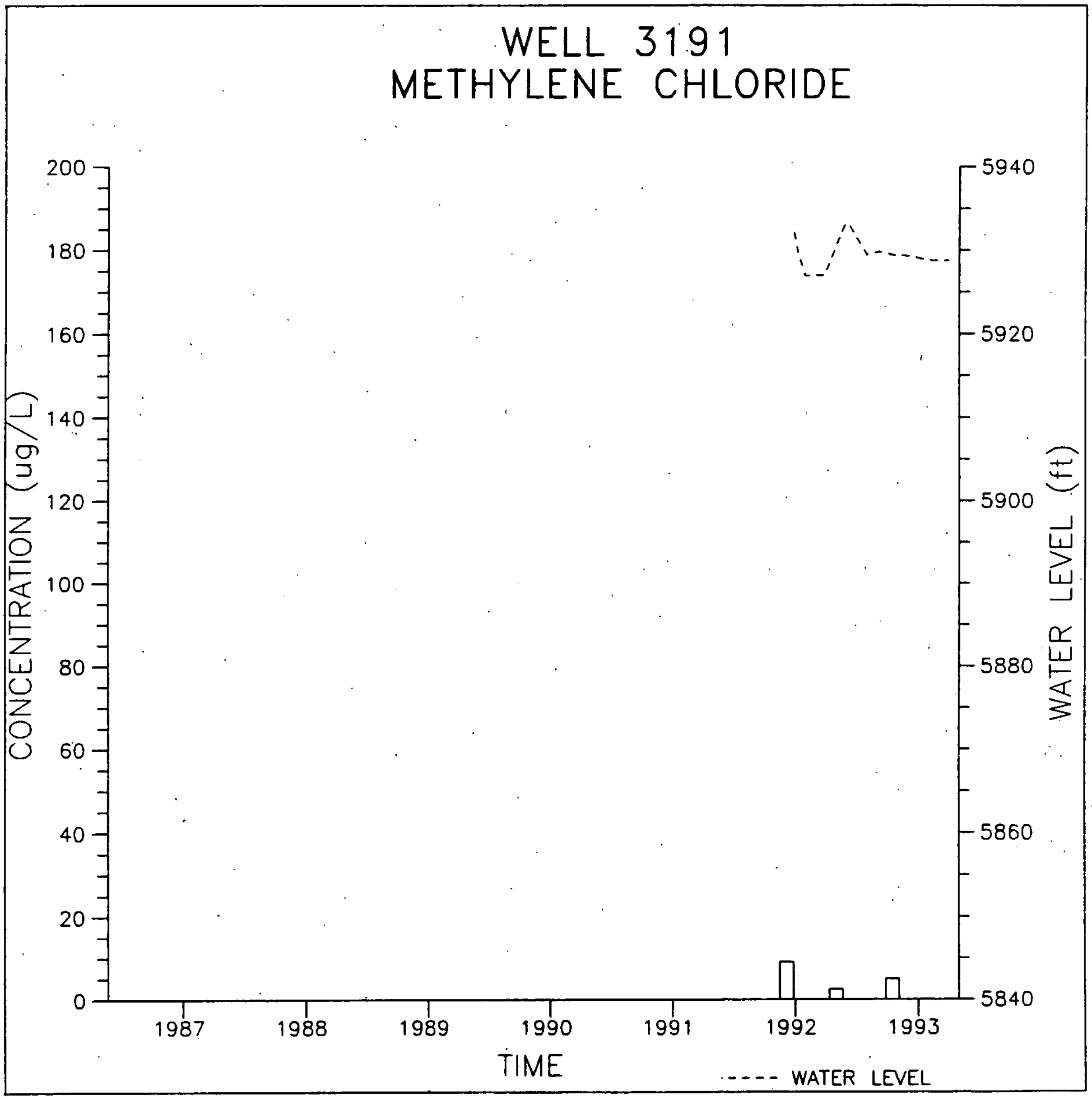


WELL P220089
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6010
5990
5970
5950
5930
5910
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

616

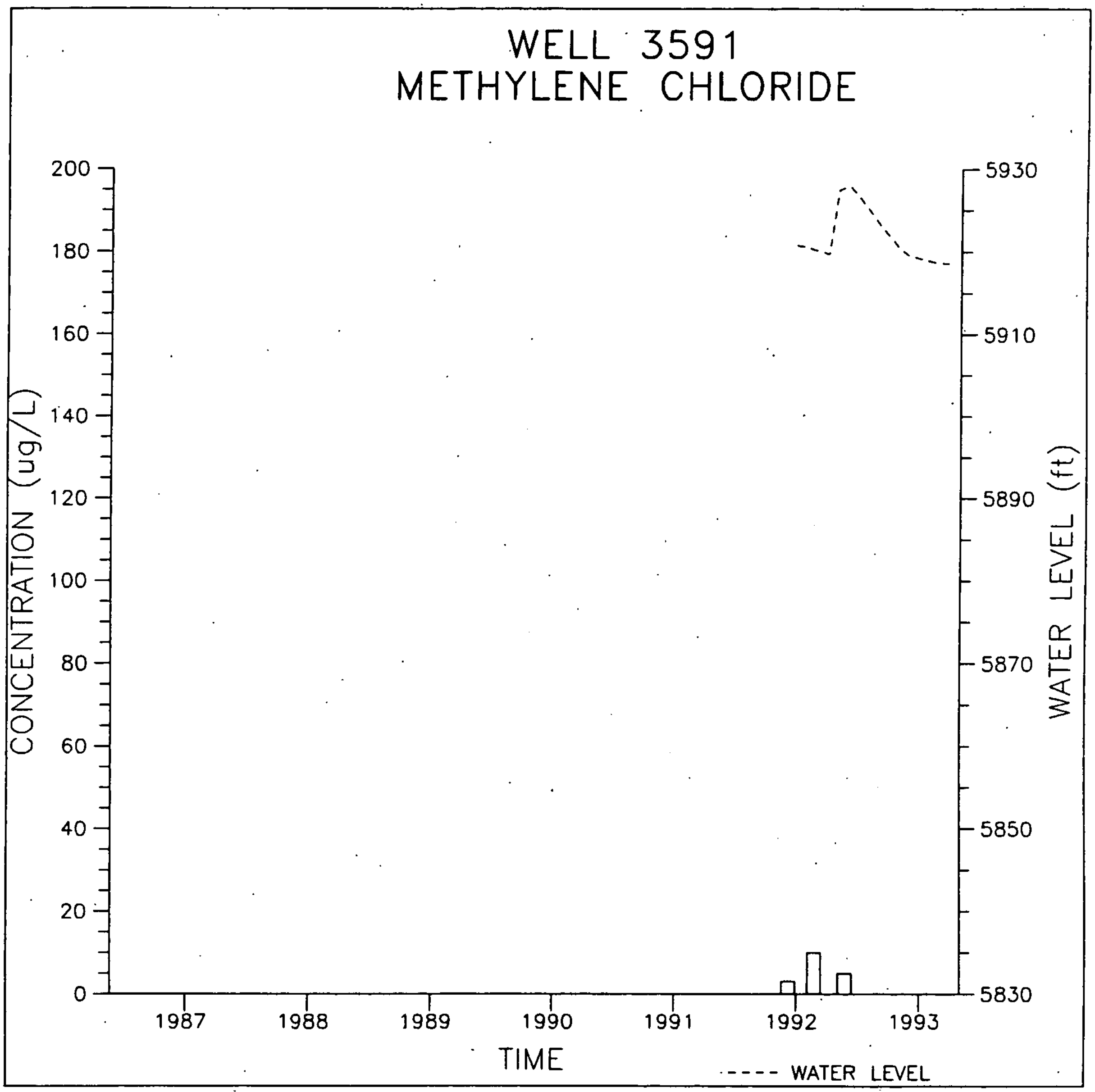

WELL P418289
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

617


WELL 3191
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

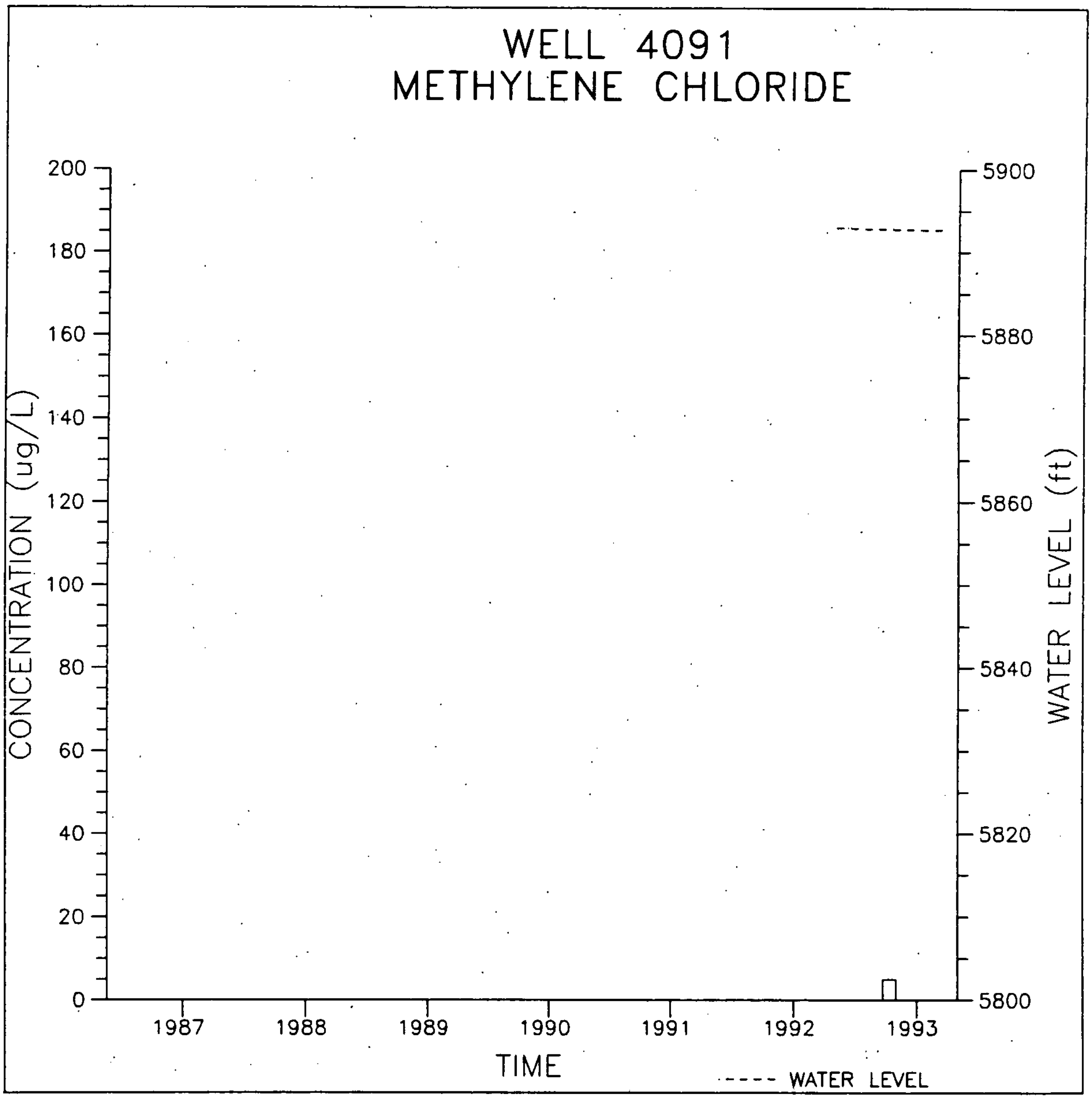
618

619


WELL 3591
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

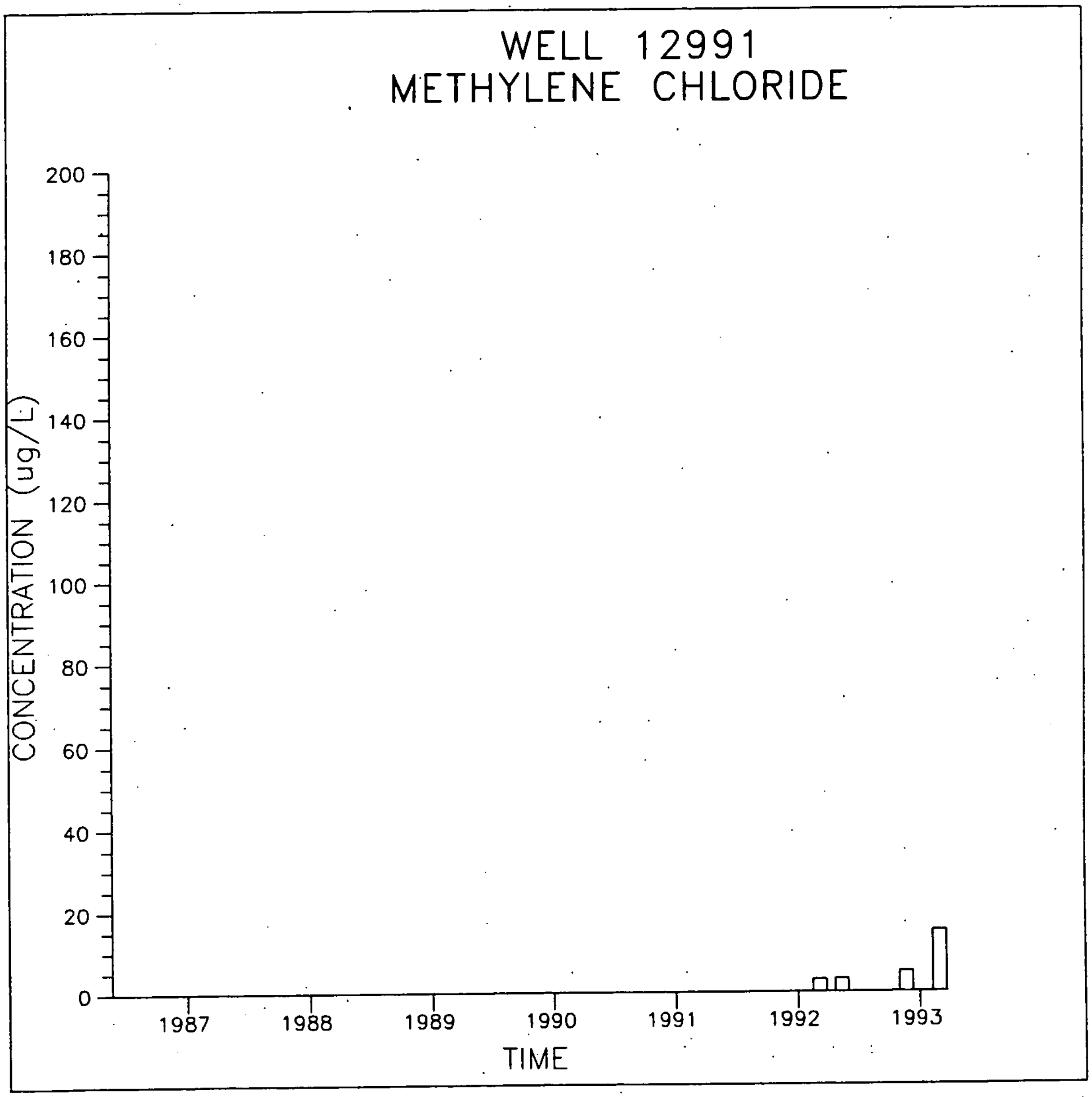
619

620



WELL 4091
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

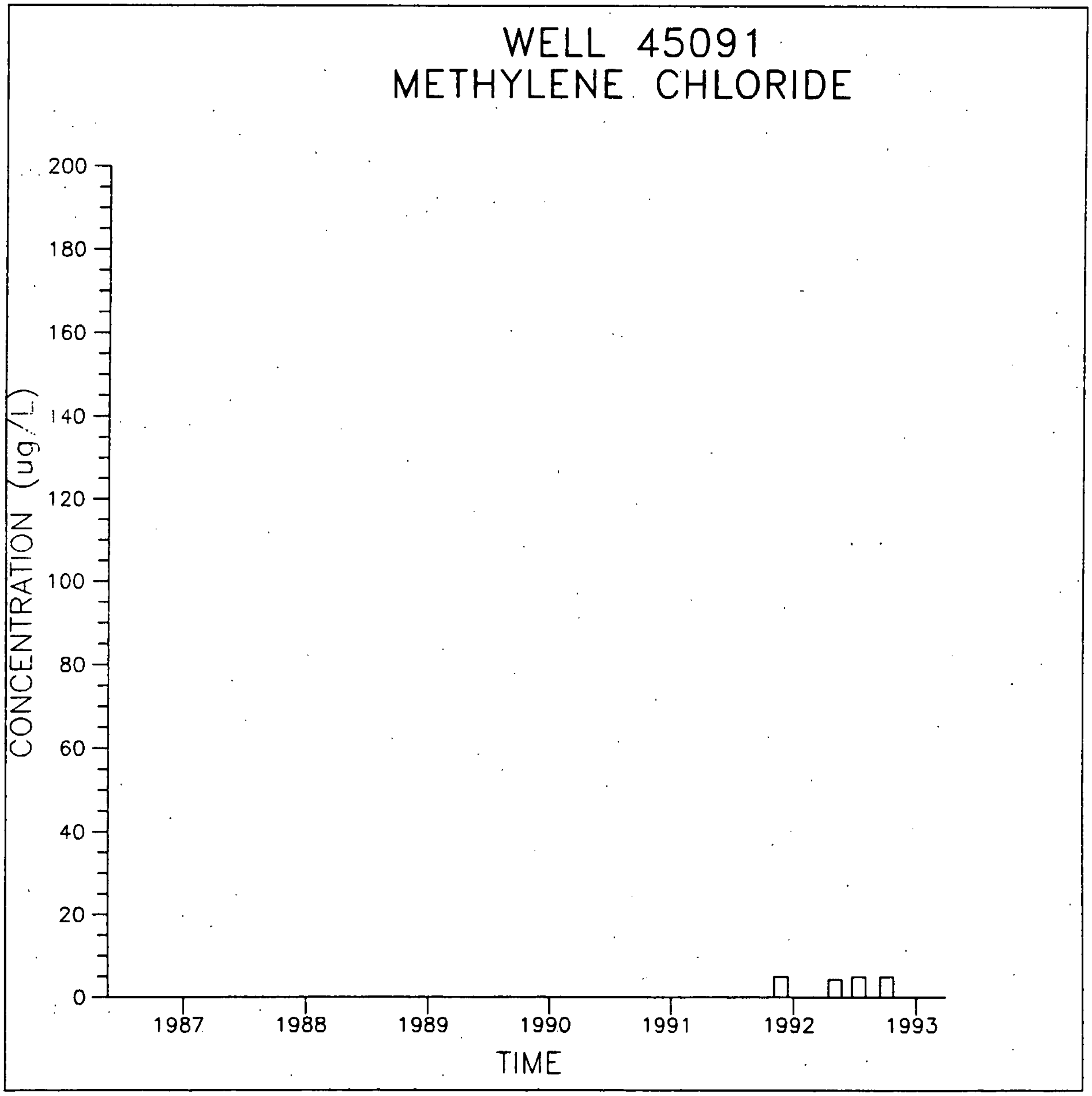
620



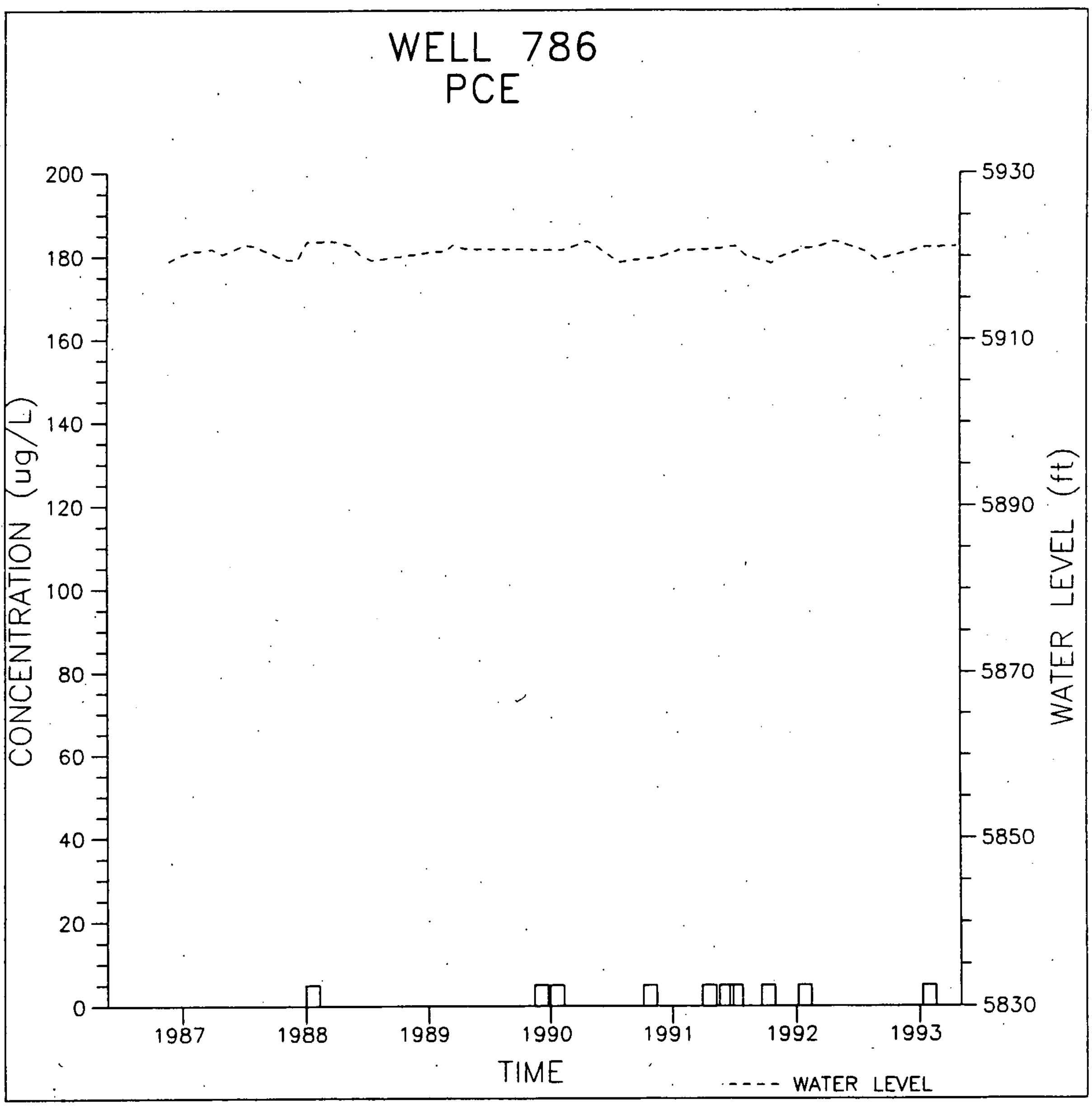
WELL 12991
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

621

622

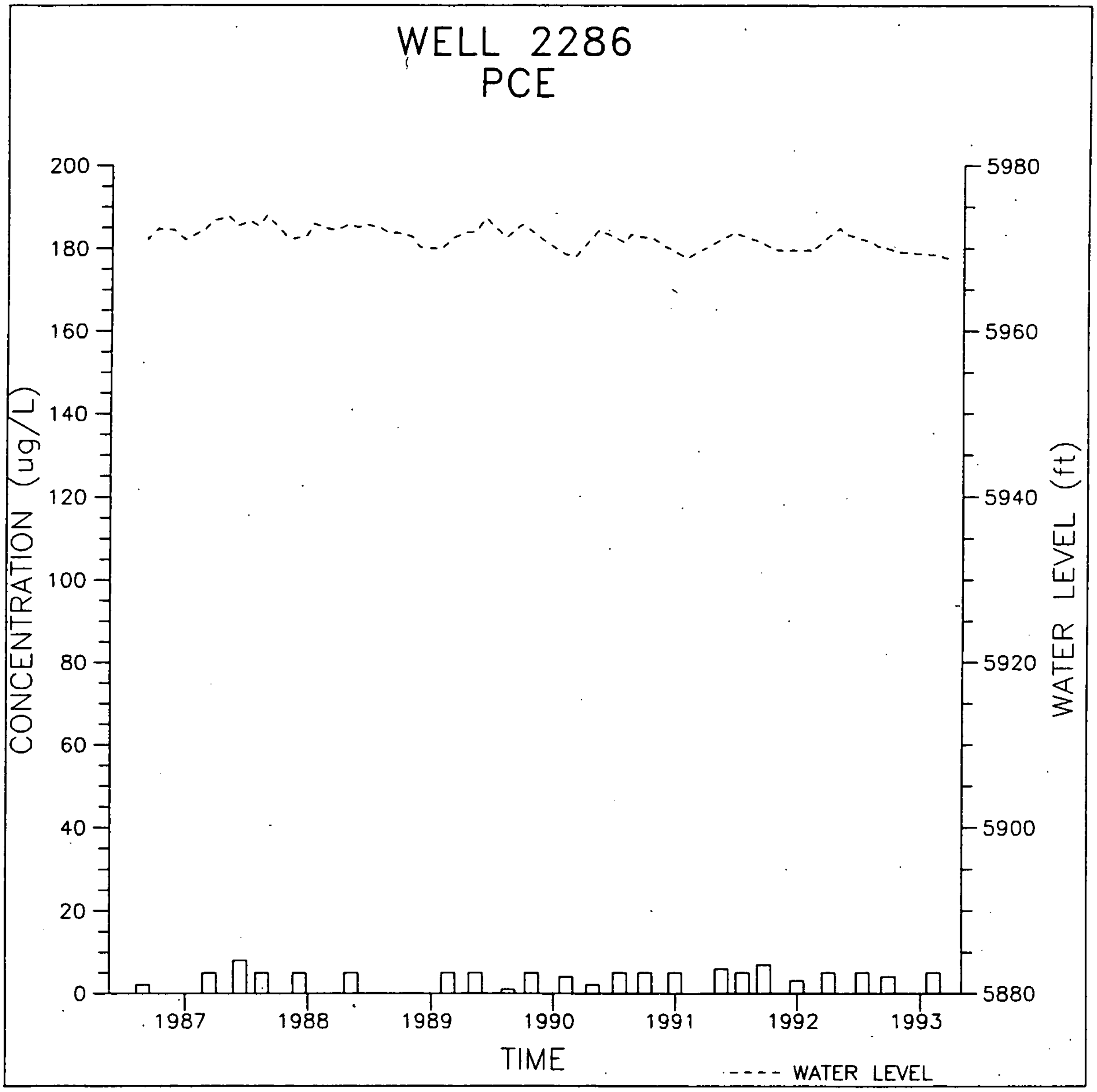

WELL 45091
METHYLENE CHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

622



WELL 786
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

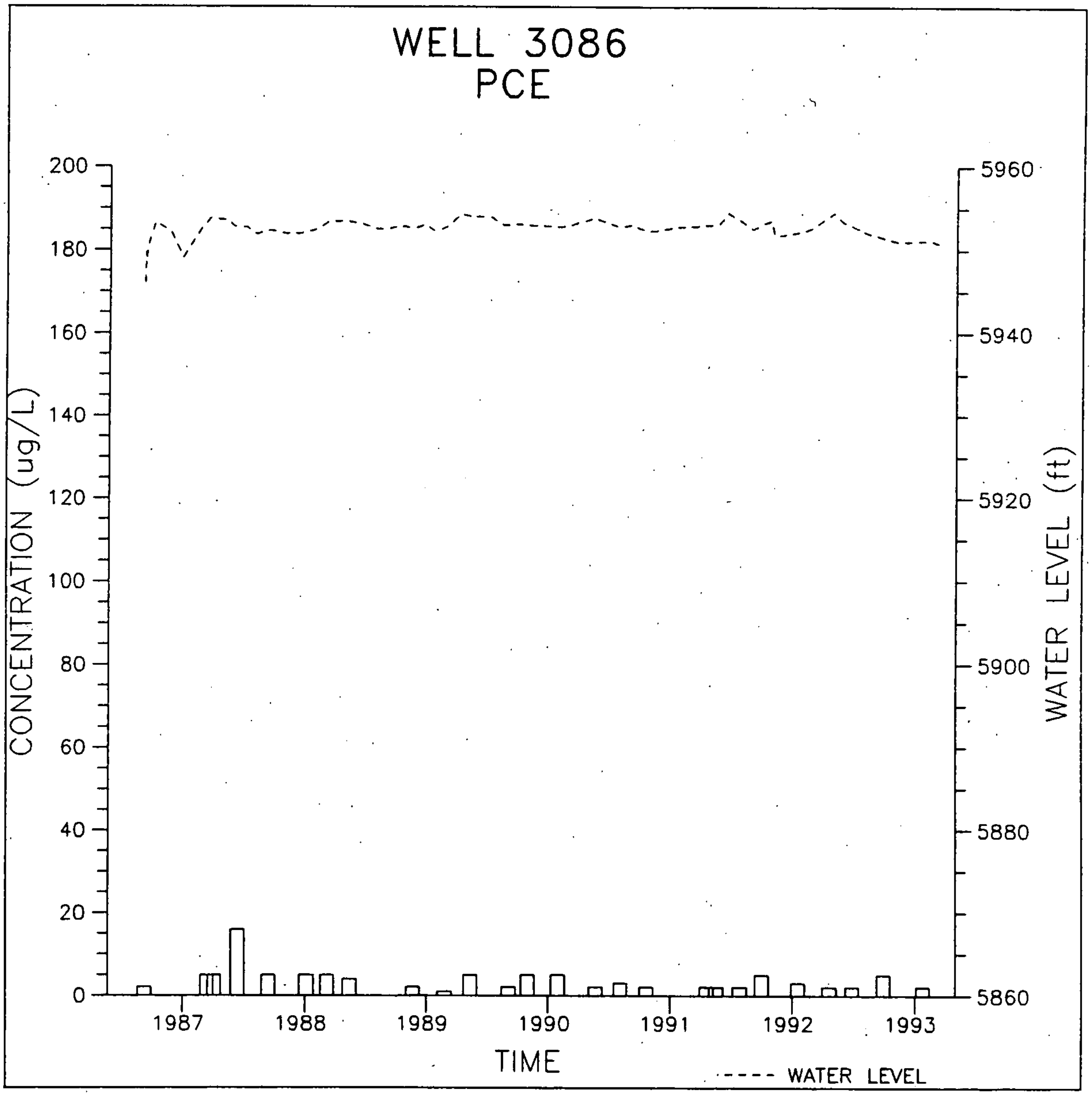
623



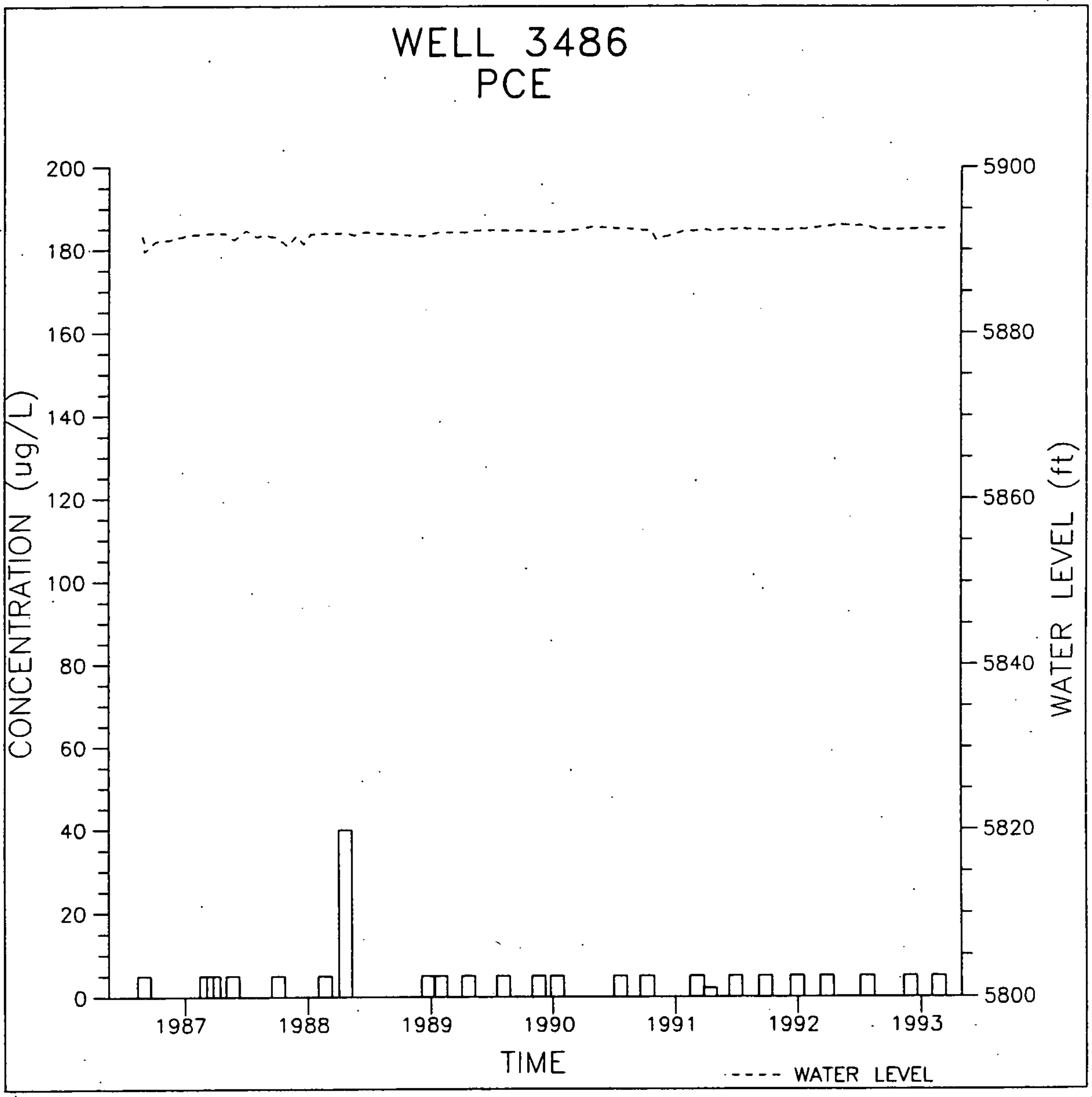
WELL 2286
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

624

625

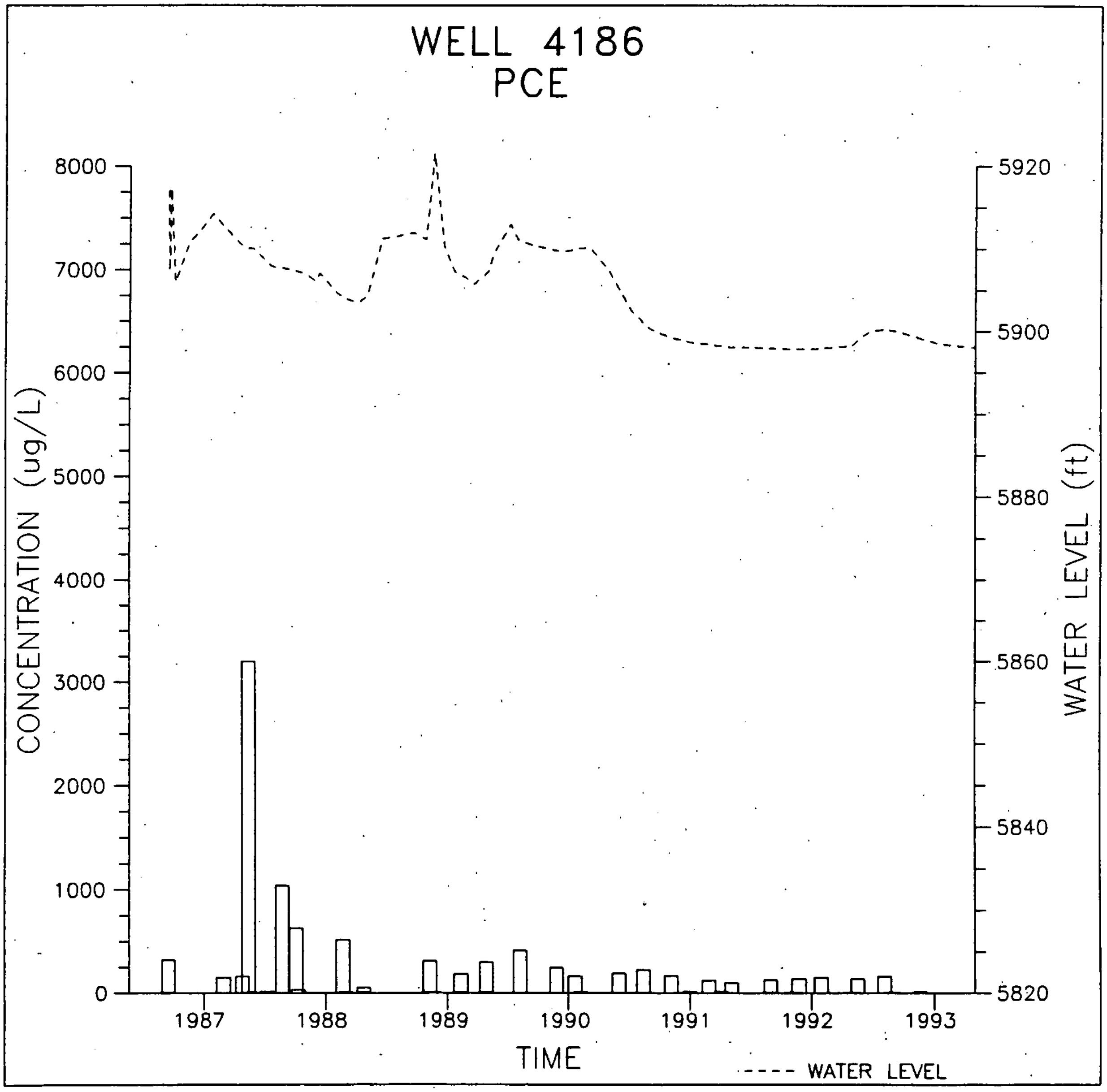

WELL 3086
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

625



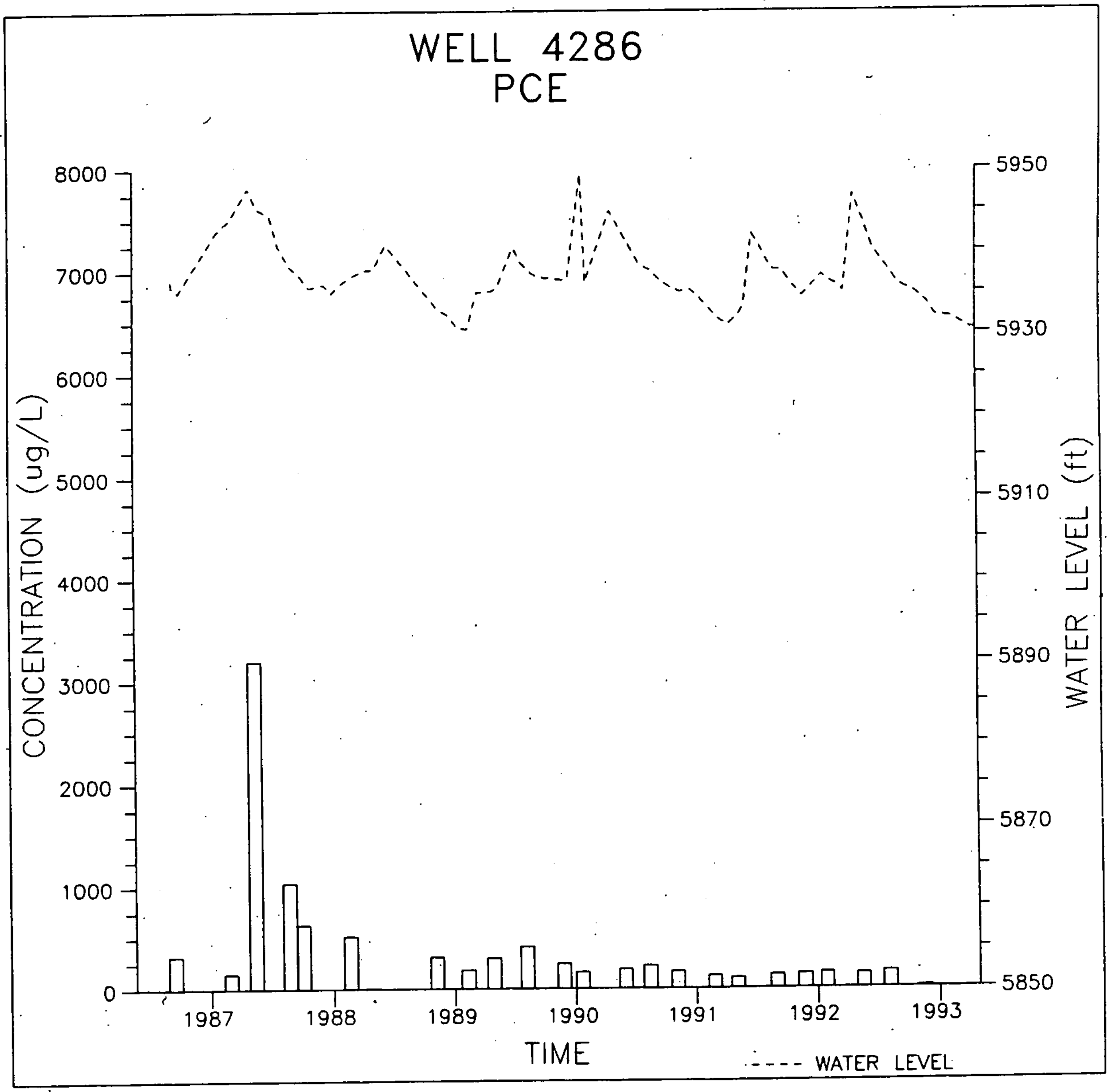
WELL 3486
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

626



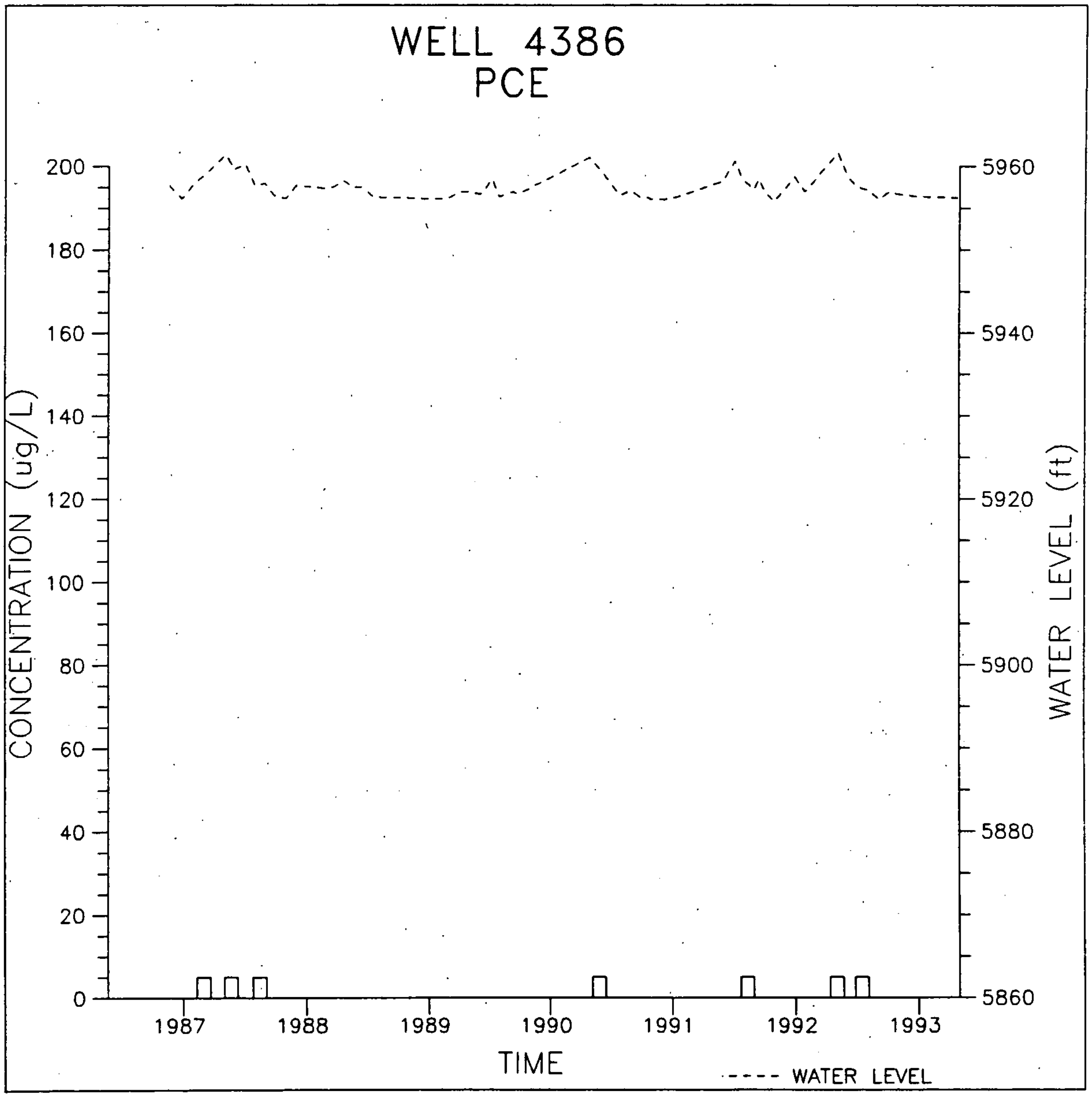
WELL 4186
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

627


WELL 4286
PCE
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5950
5930
5910
5890
5870
5850
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

628

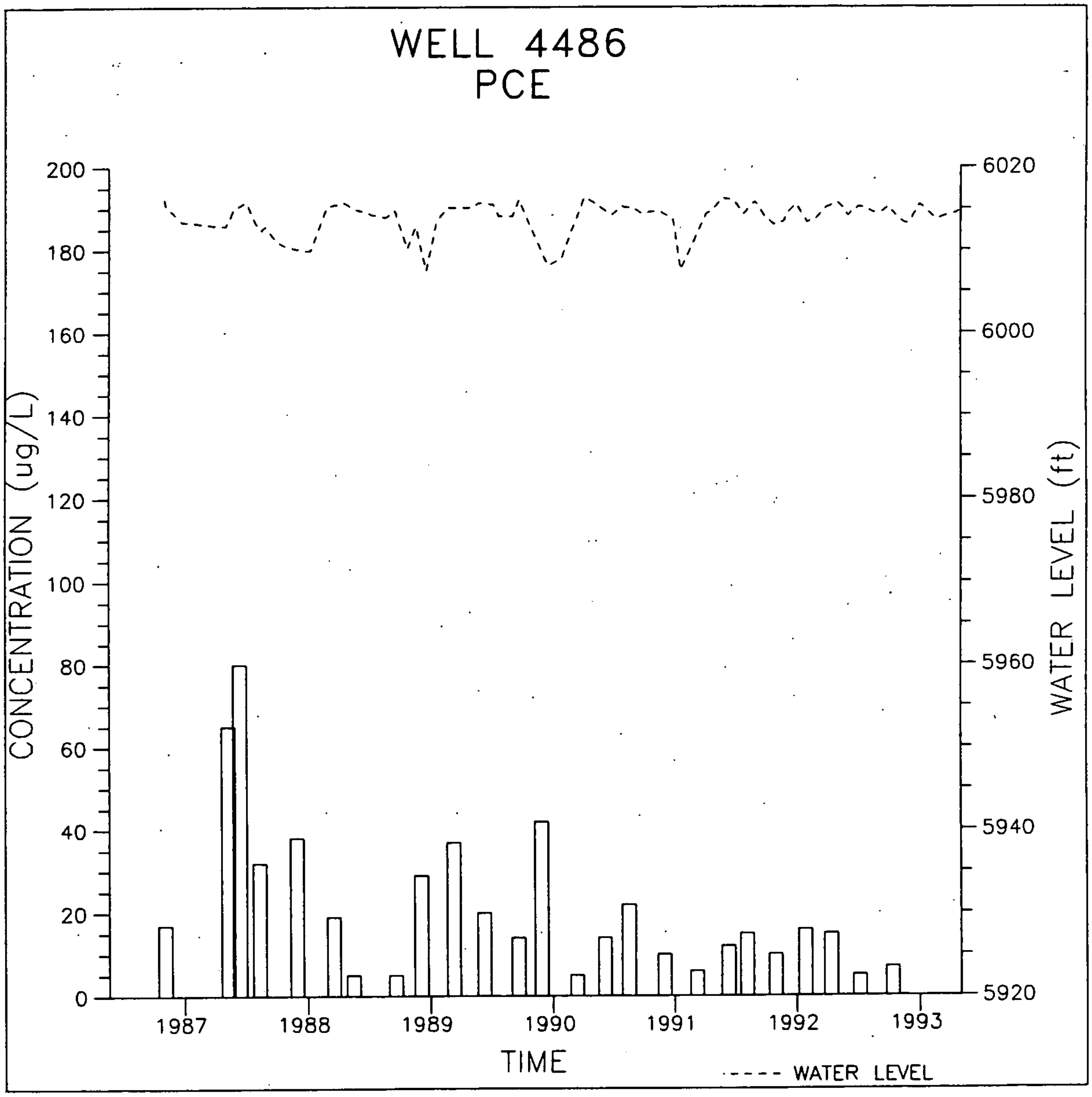
629



WELL 4386
PCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

629

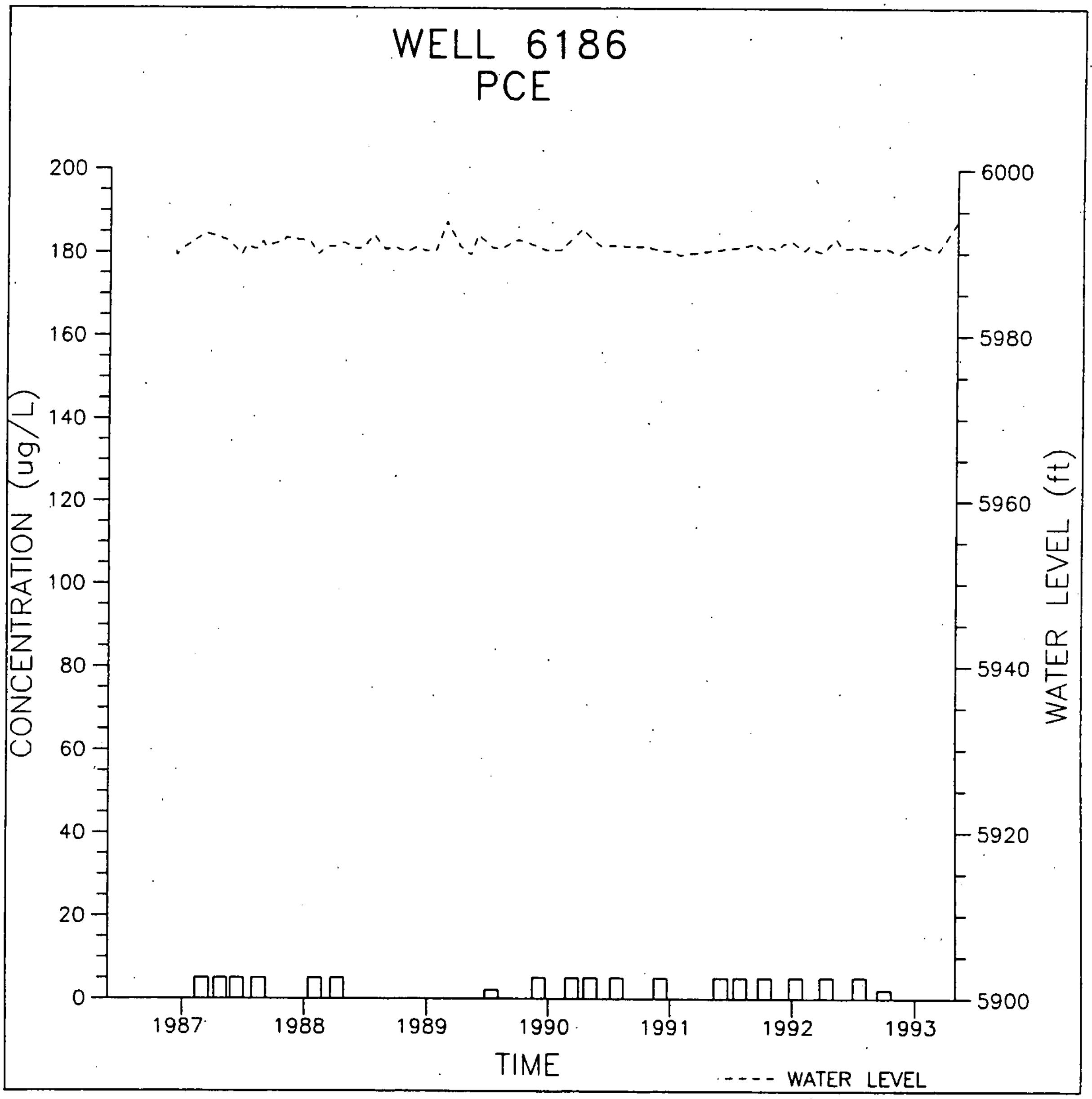
~~629~~ 630



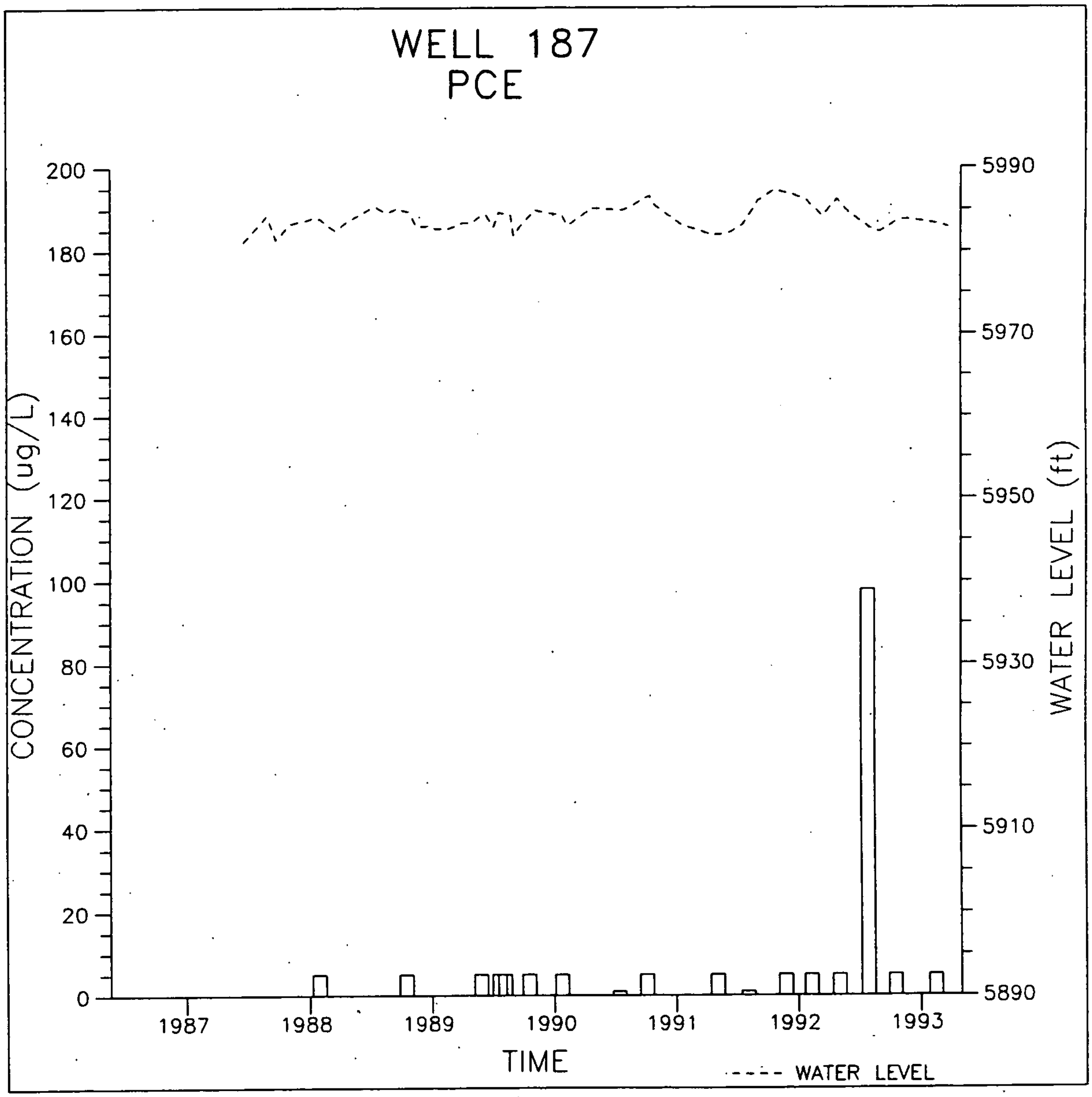
WELL 4486
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

630

631

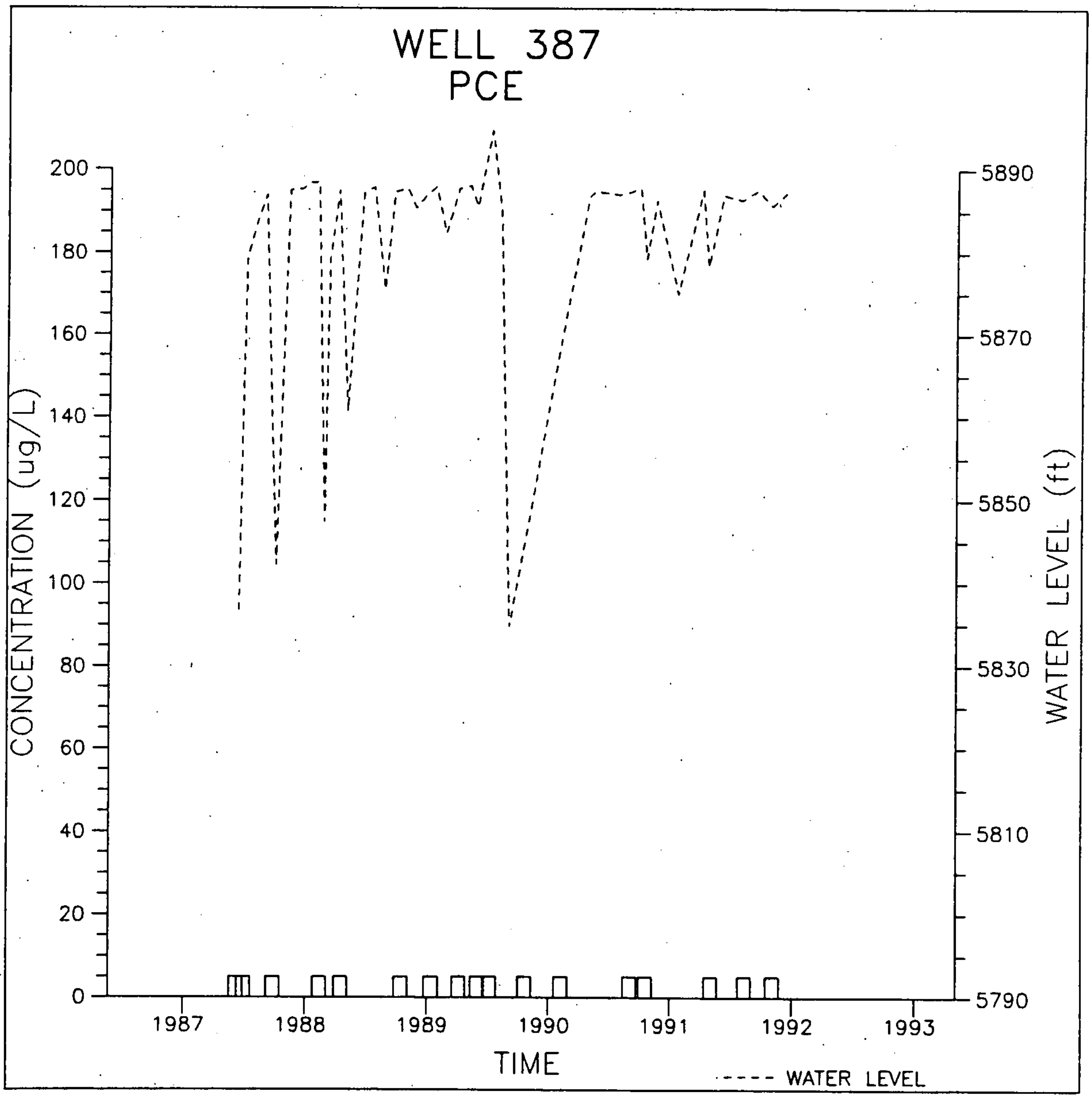

WELL 6186
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6000
5980
5960
5940
5920
5900
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

631


WELL 187
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

632

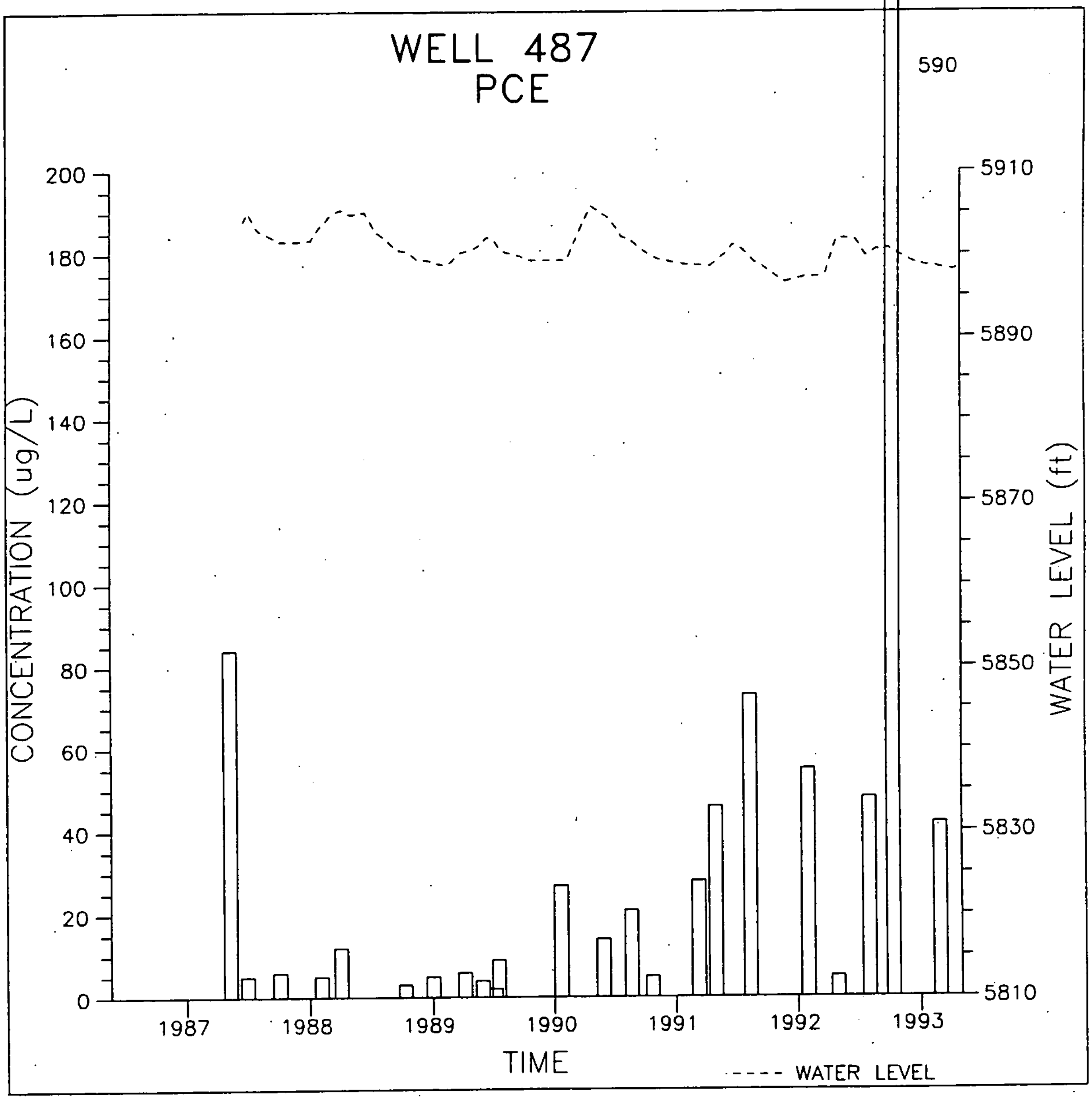
633



WELL 387
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

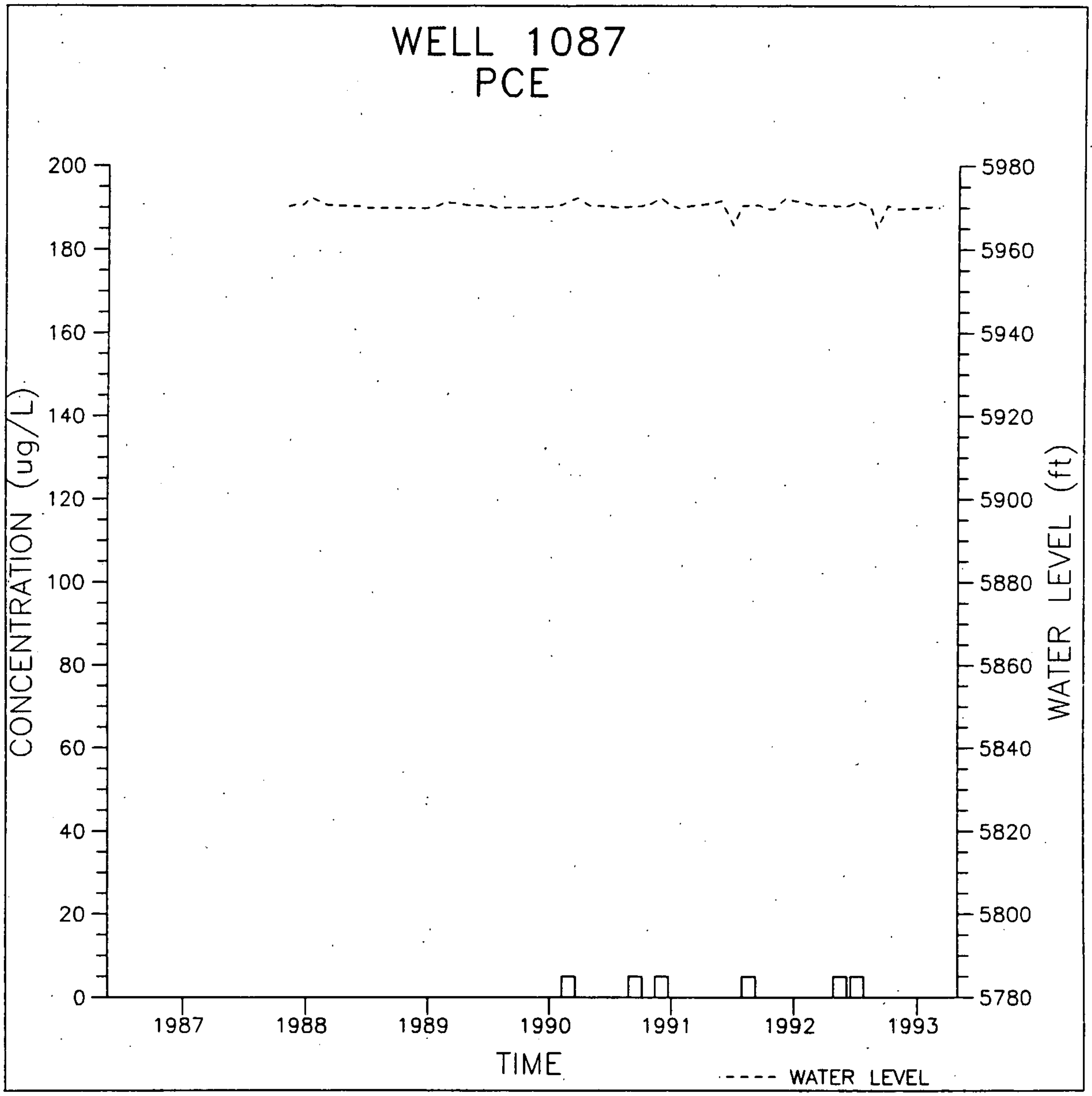
633

634

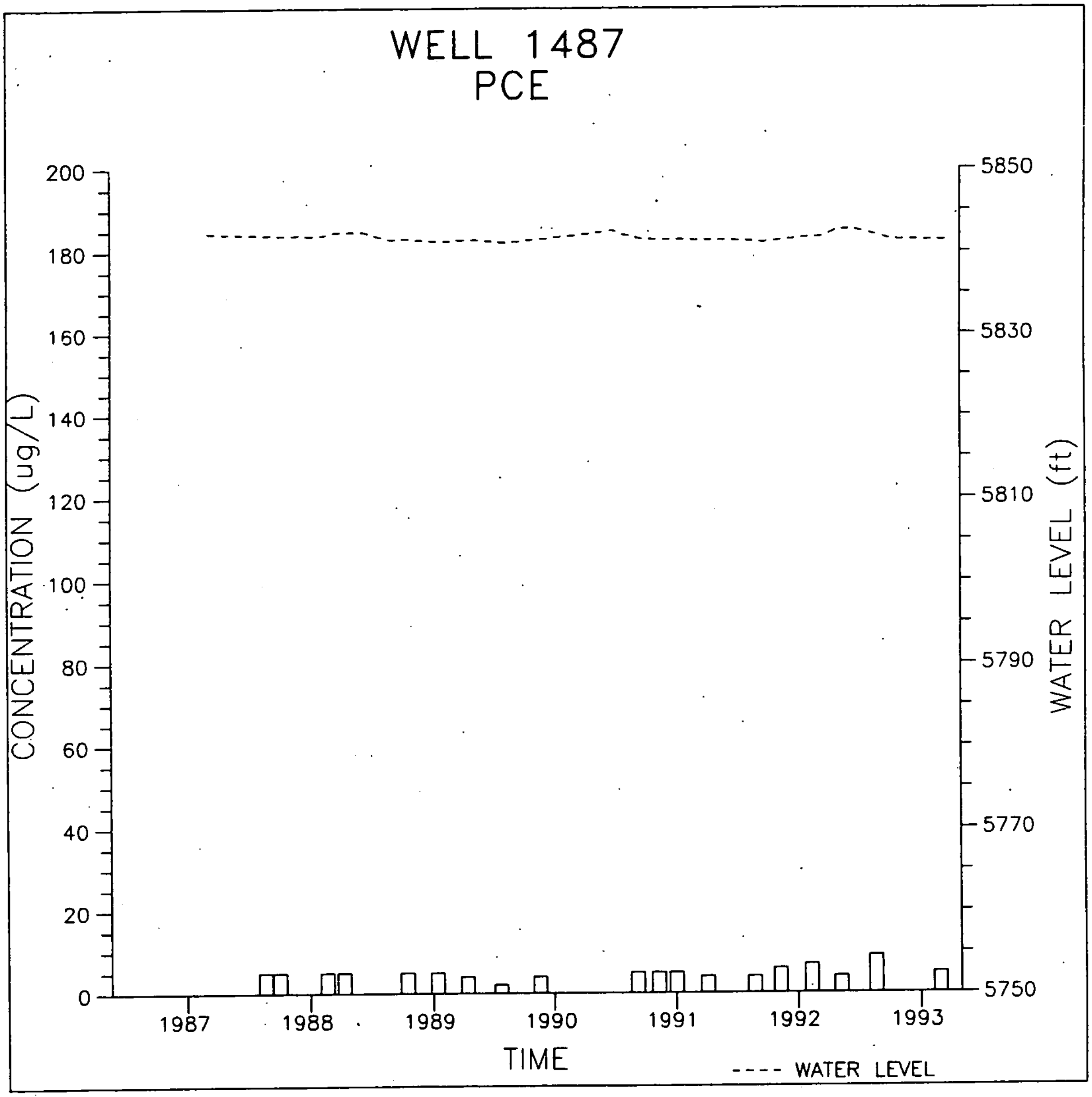


WELL 487
PCE
590
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
5910
5890
5870
5850
5830
5810
WATER LEVEL (ft)
---- WATER LEVEL

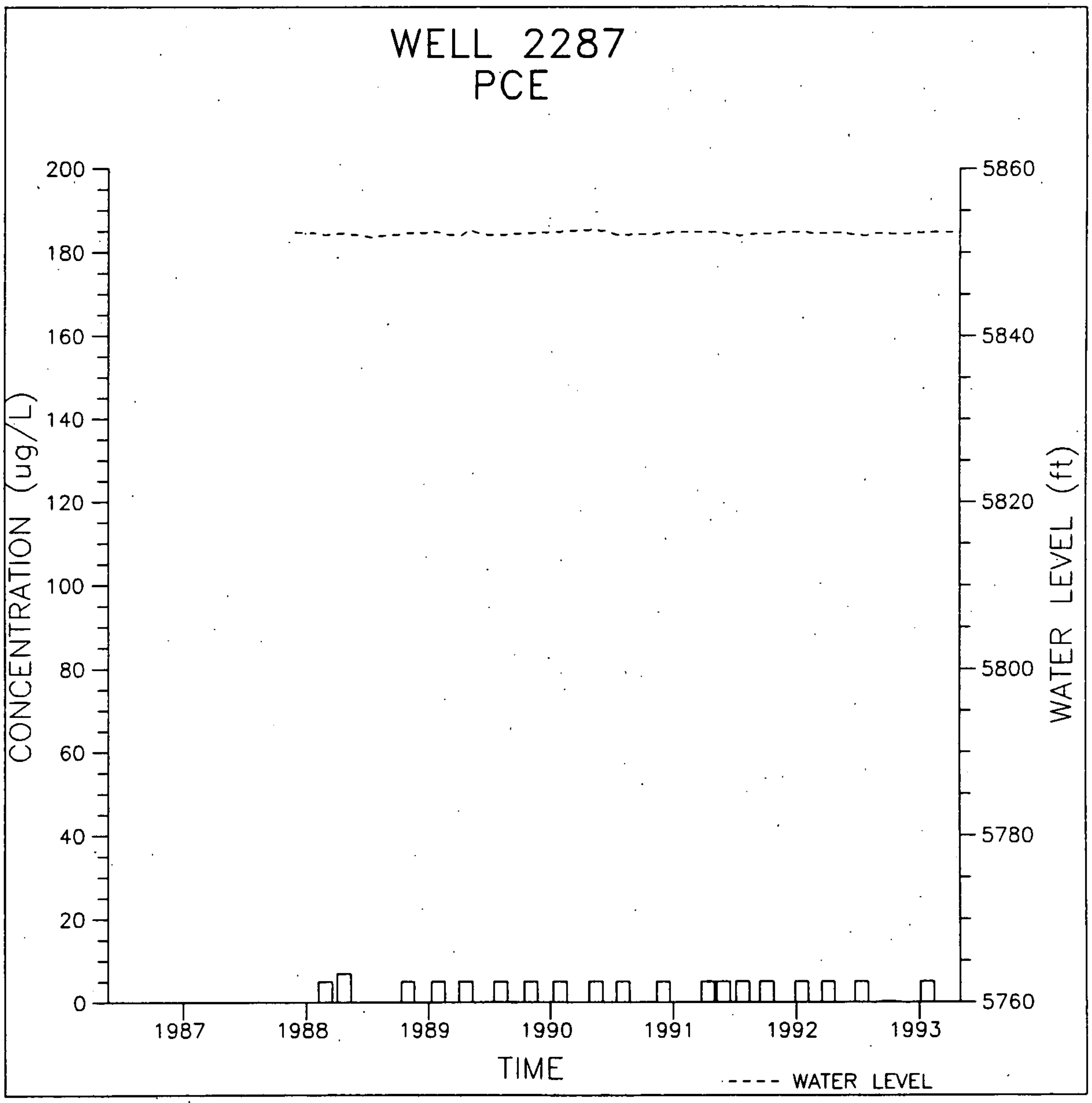
634


WELL 1087
PCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

635

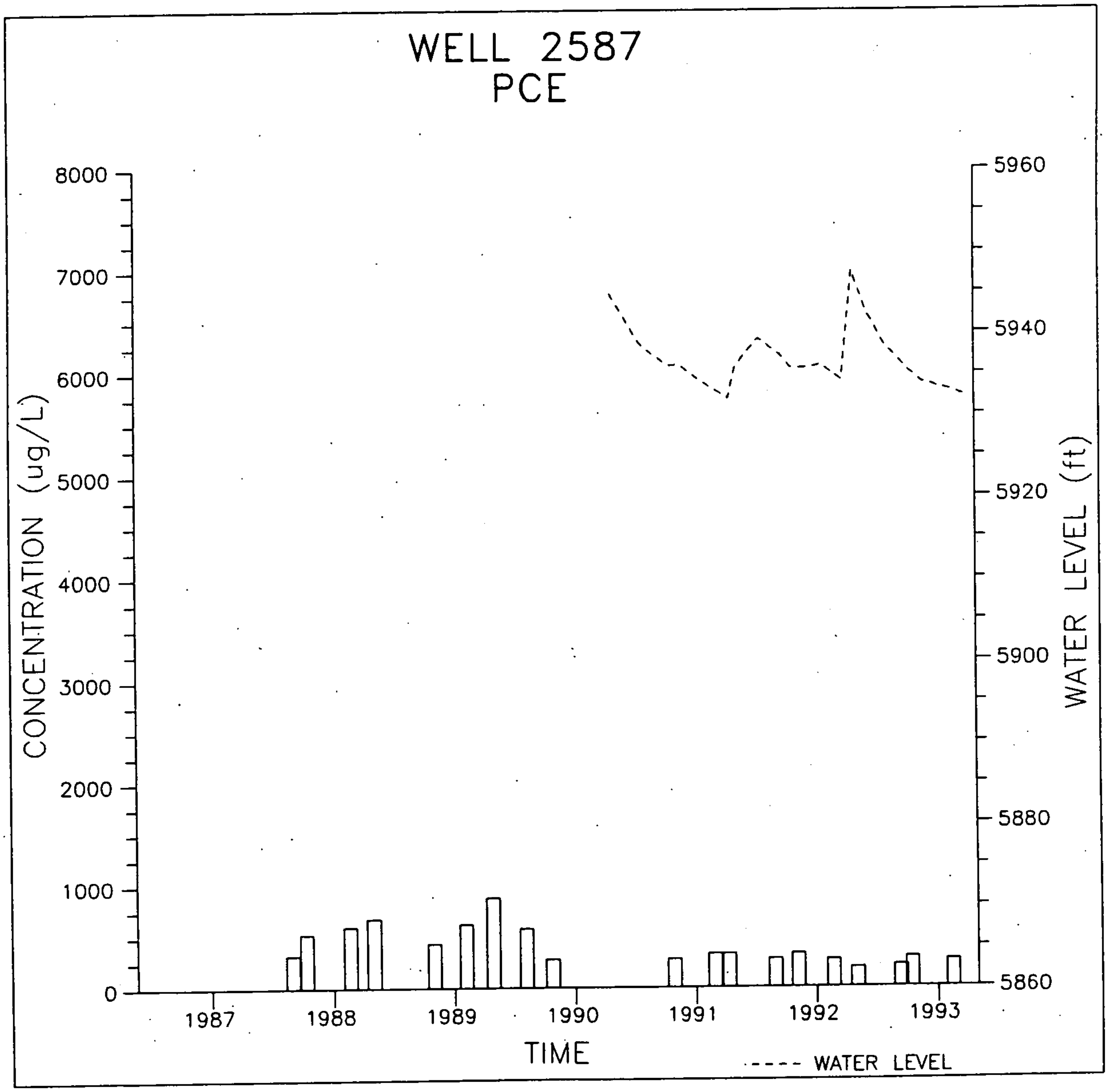


WELL 1487
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

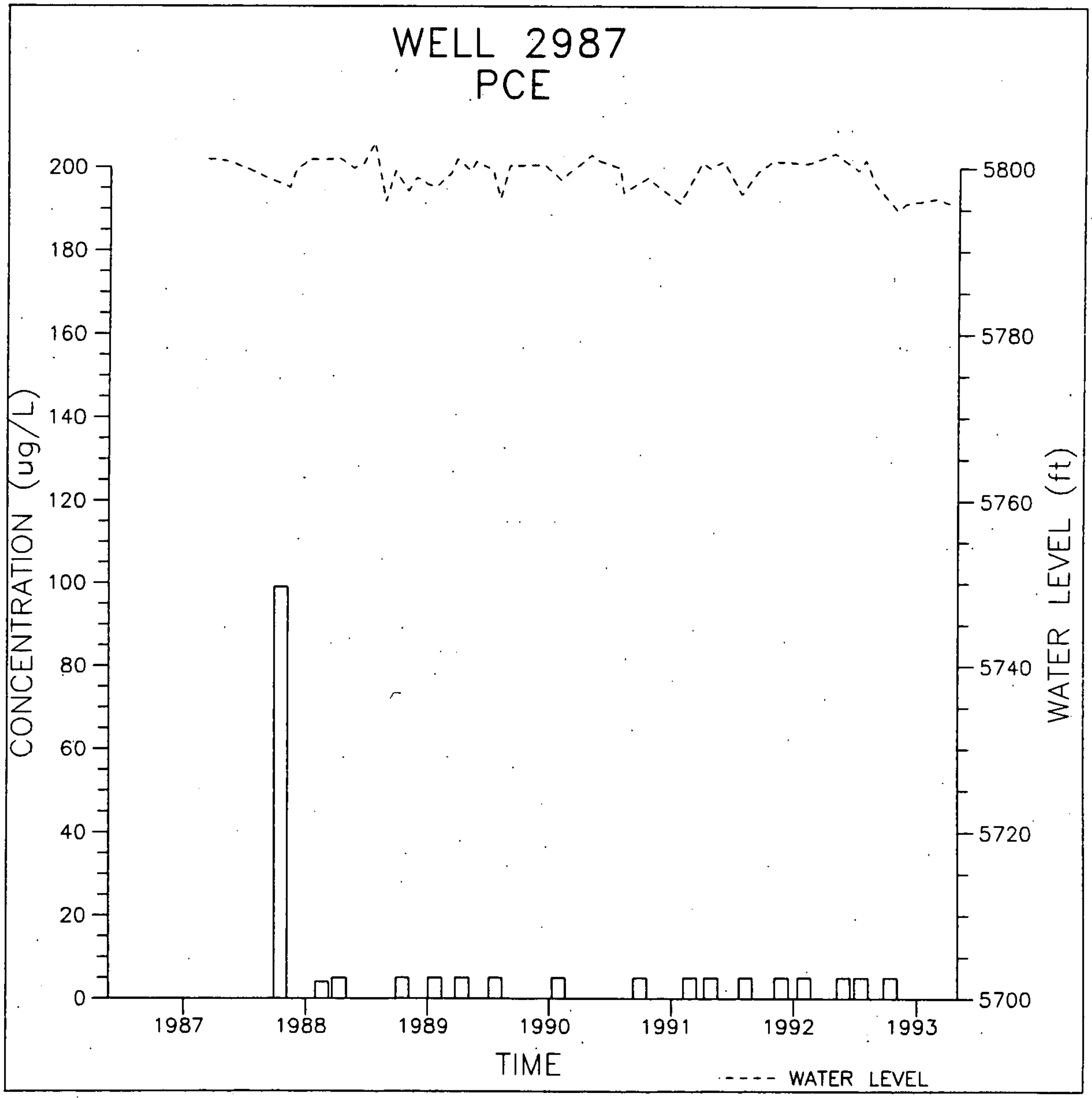


WELL 2287
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

637


WELL 2587
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

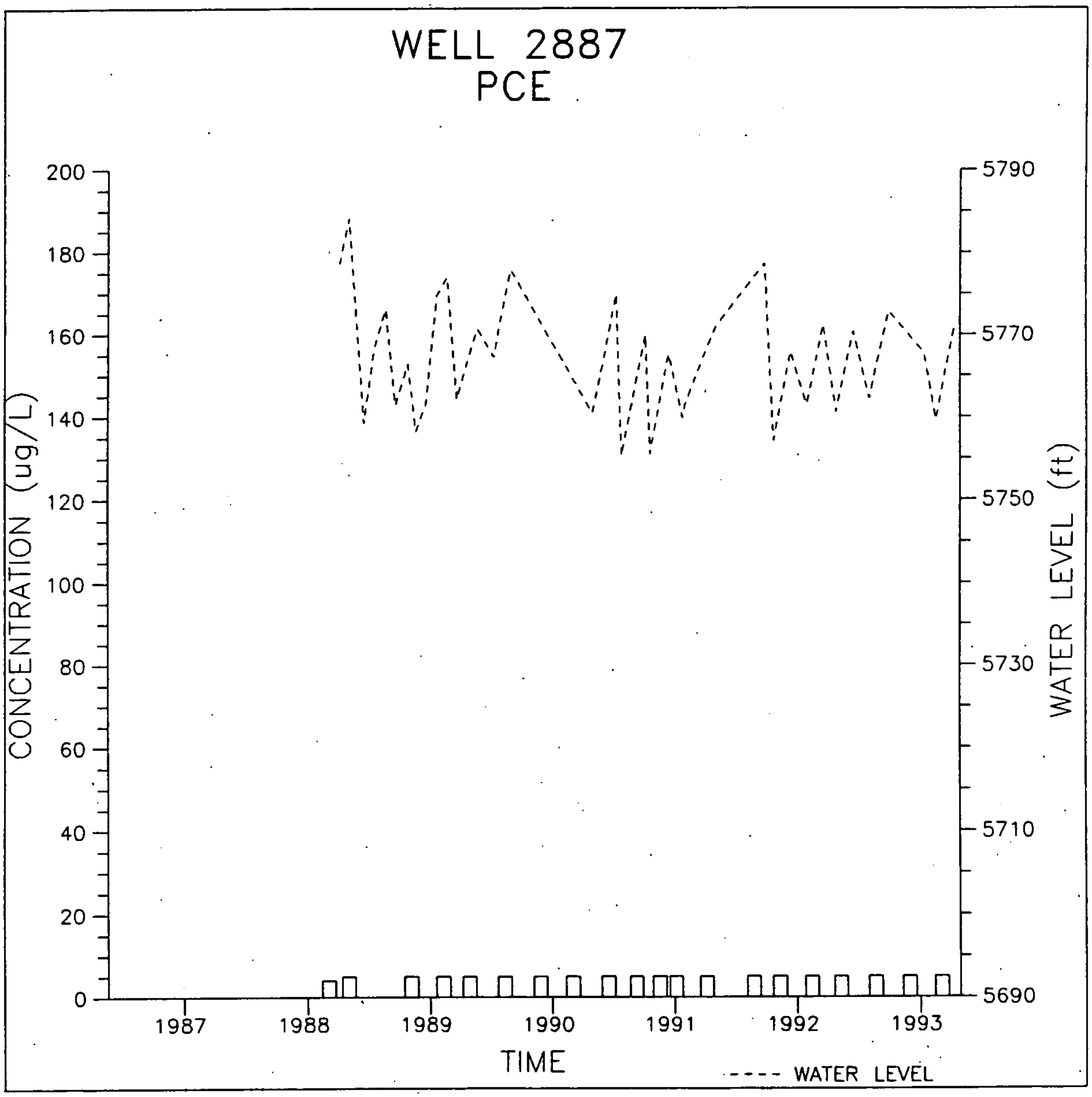
638



WELL 2987
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5800
5780
5760
5740
5720
5700
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

639

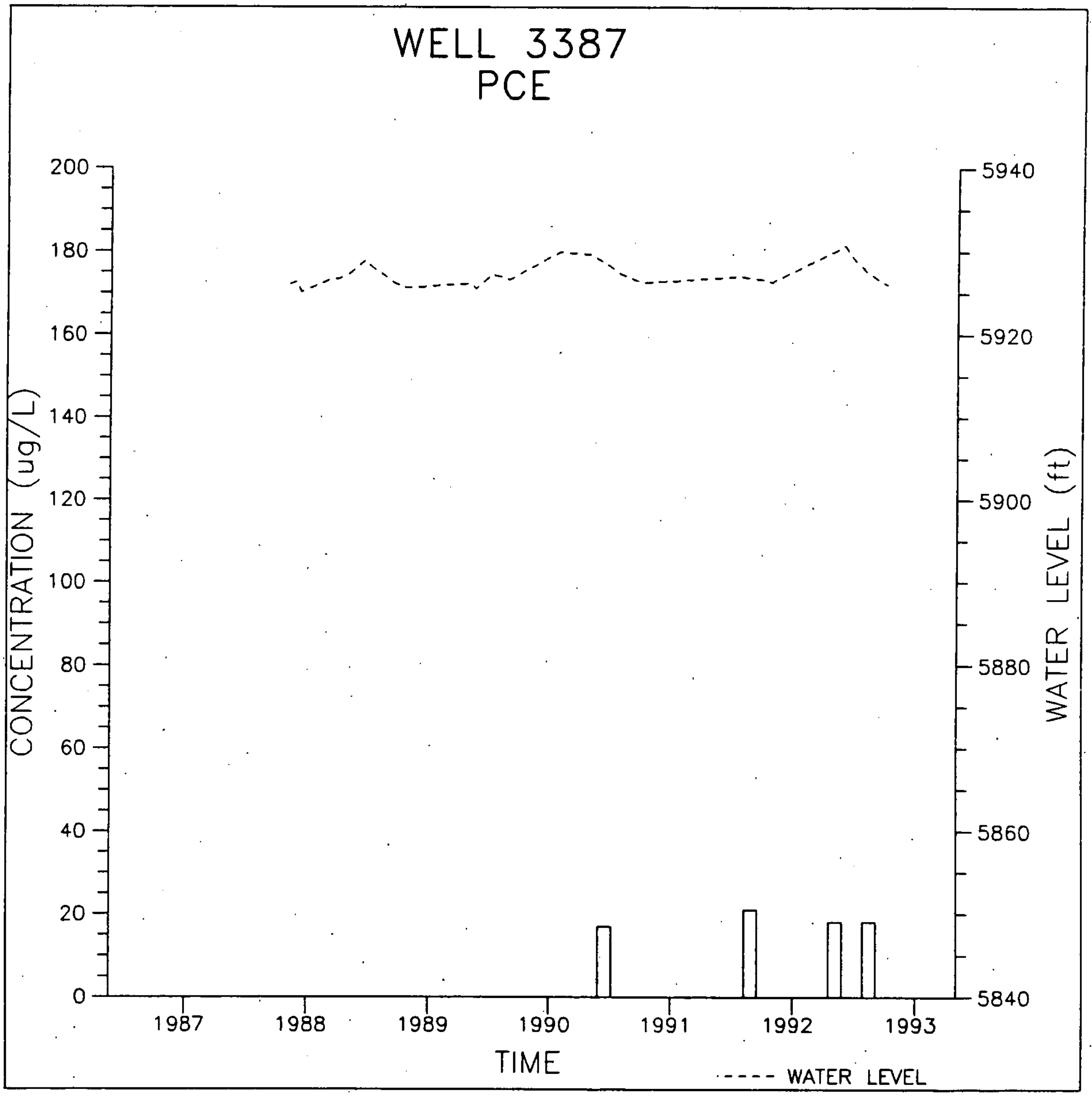
teta



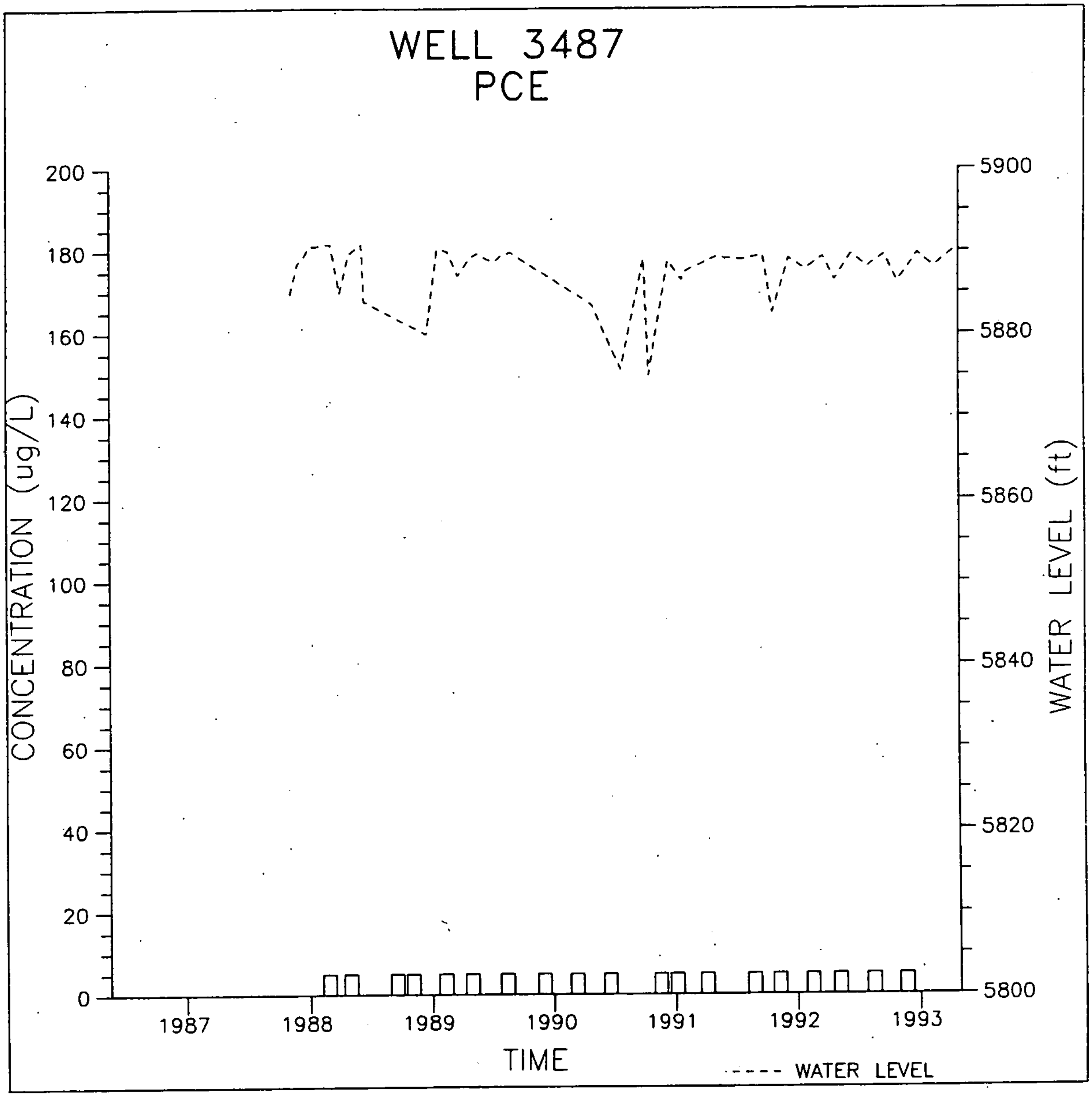
WELL 2887
PCE
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5790
5770
5750
5730
5710
5690
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

640

c64h


WELL 3387
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

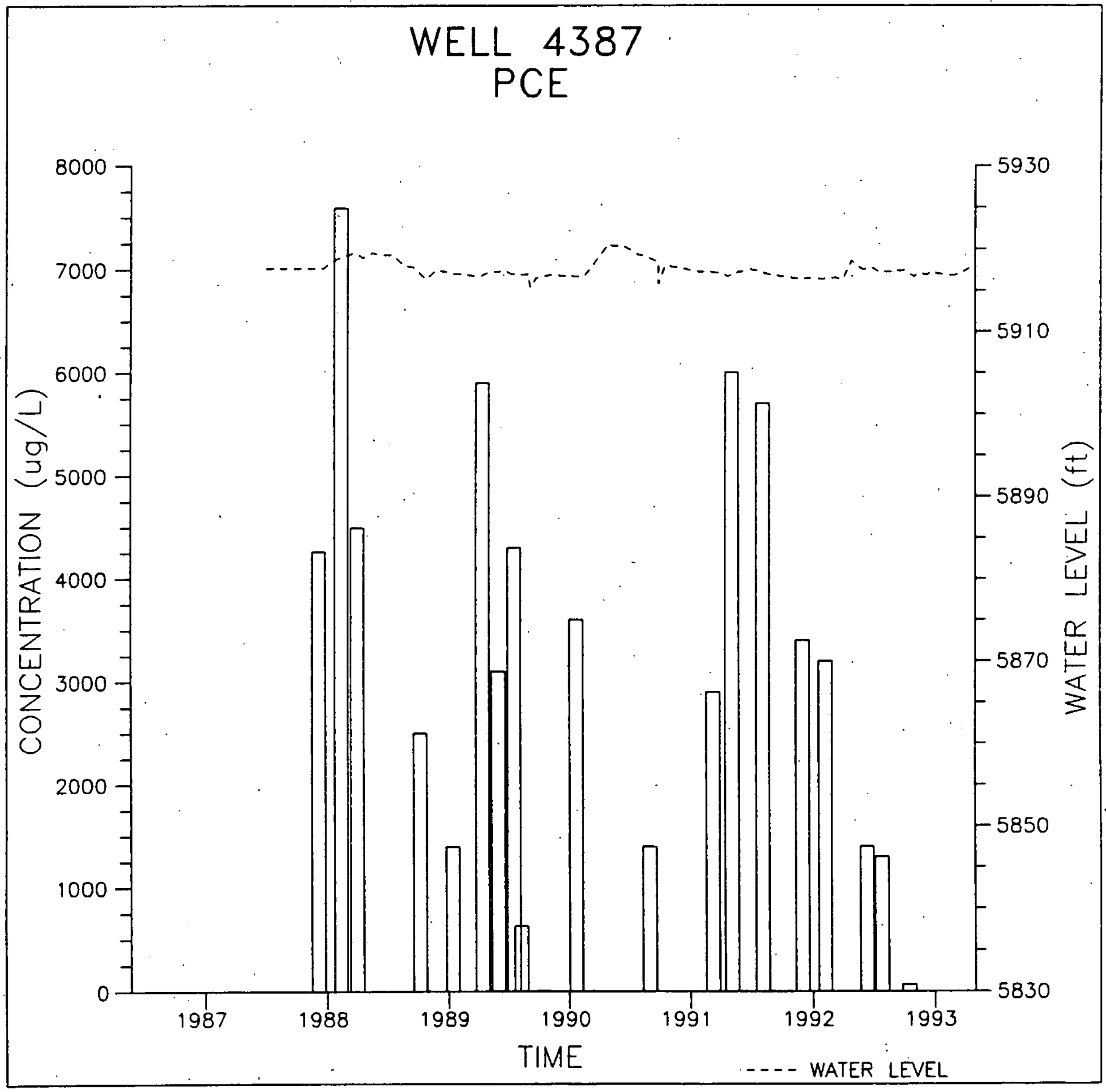
641



WELL 3487
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

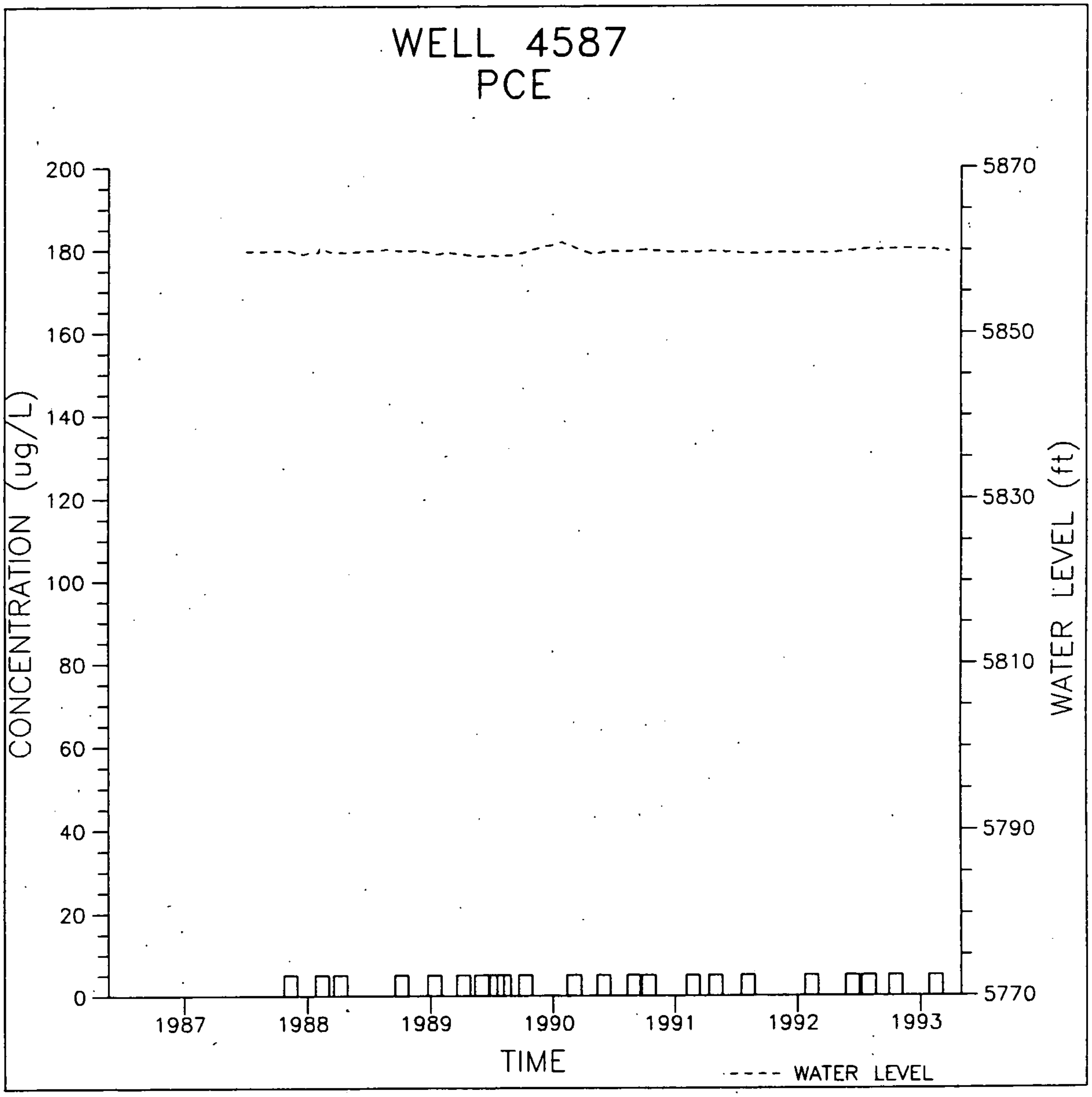
642

643

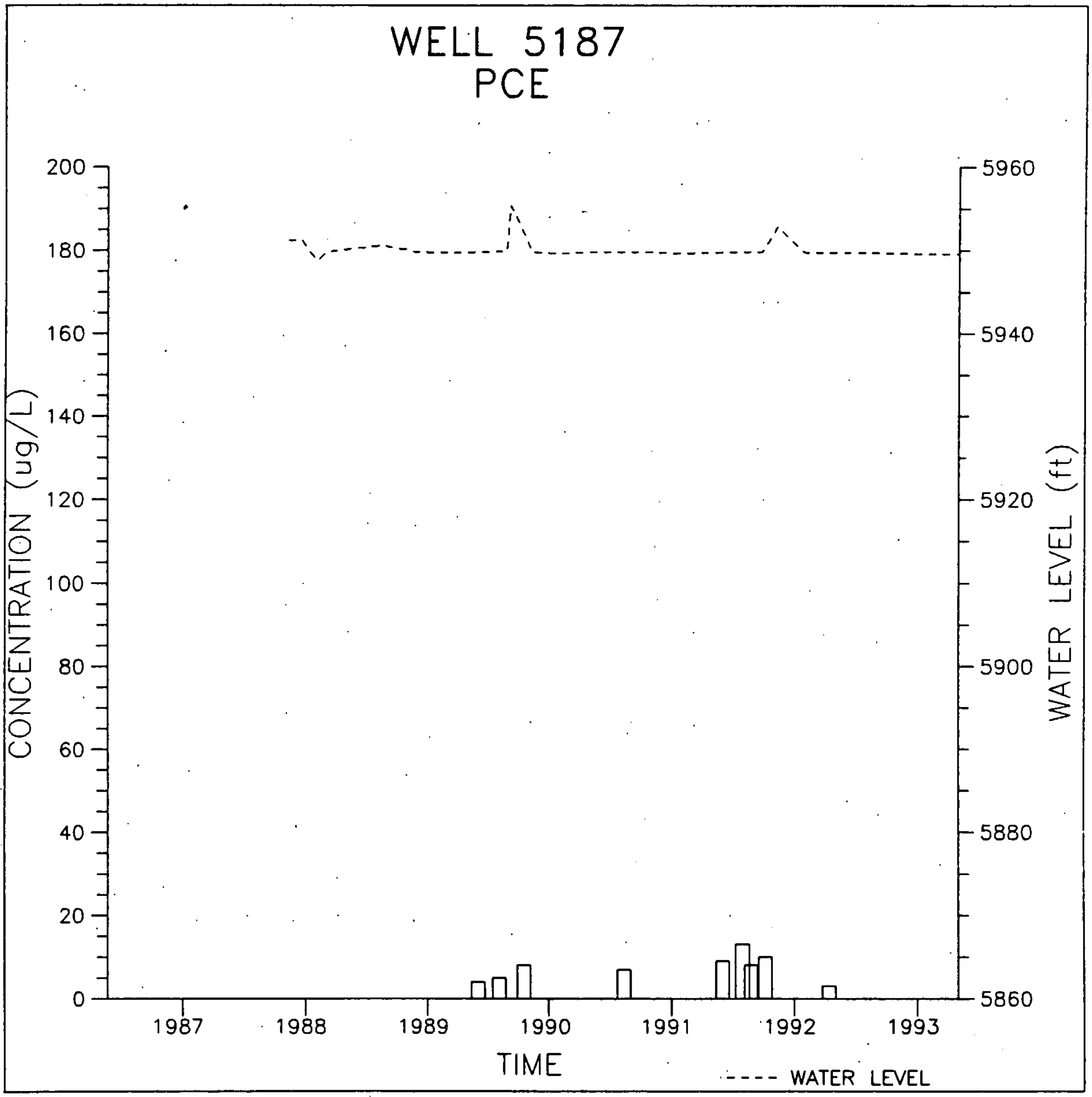


WELL 4387
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

643

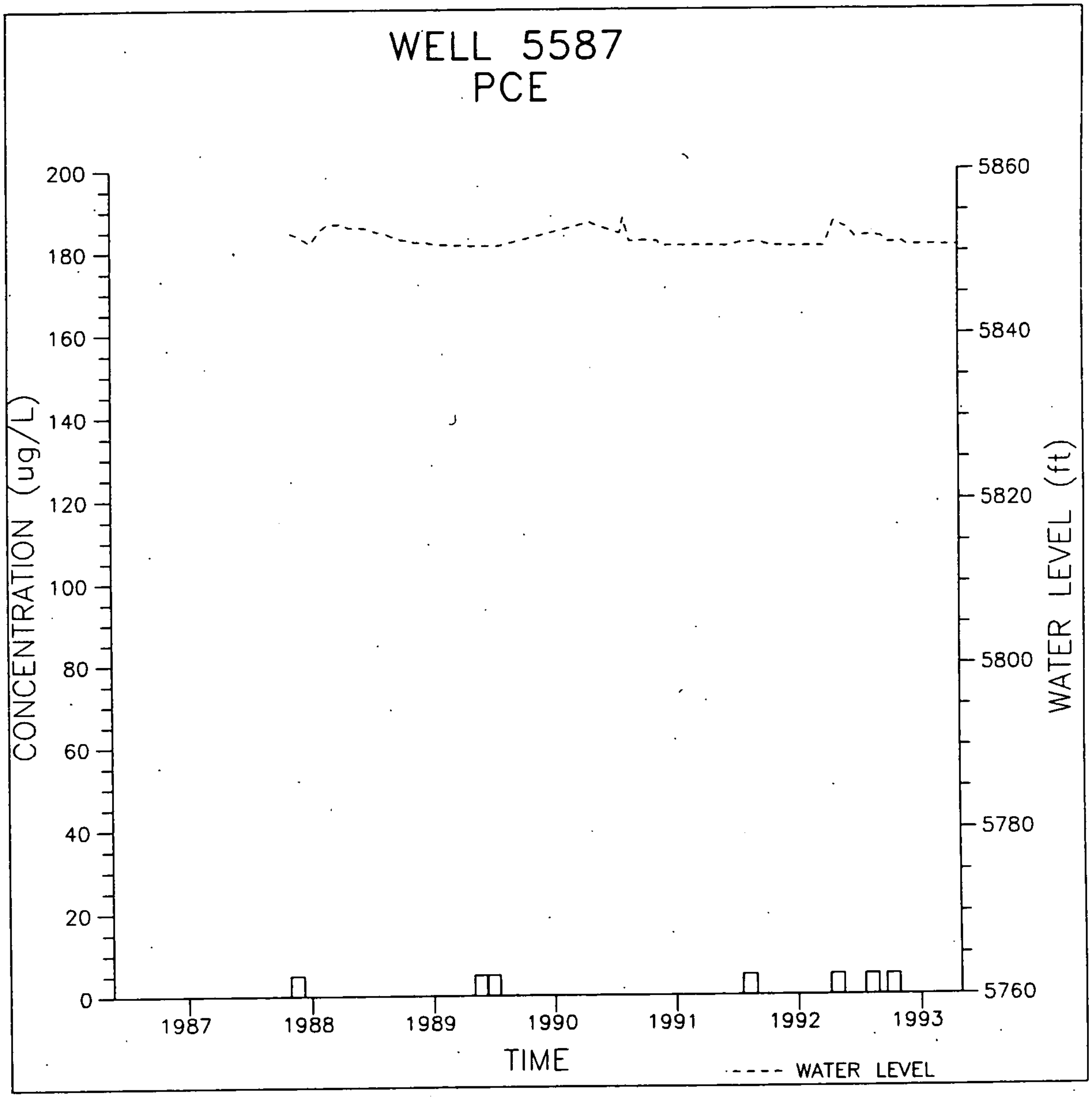

WELL 4587
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5870
5850
5830
5810
5790
5770
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

644



WELL 5187
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

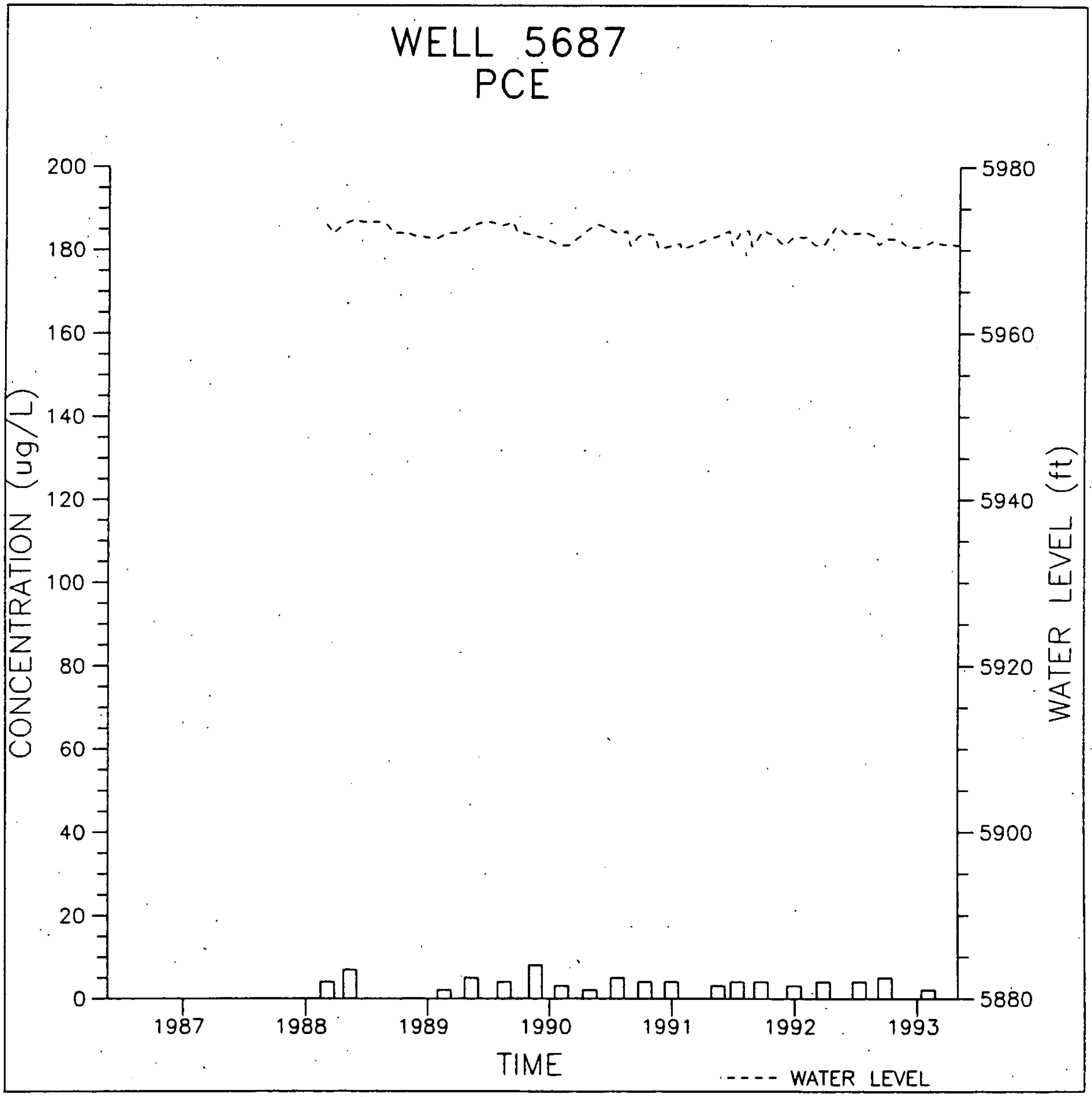
645



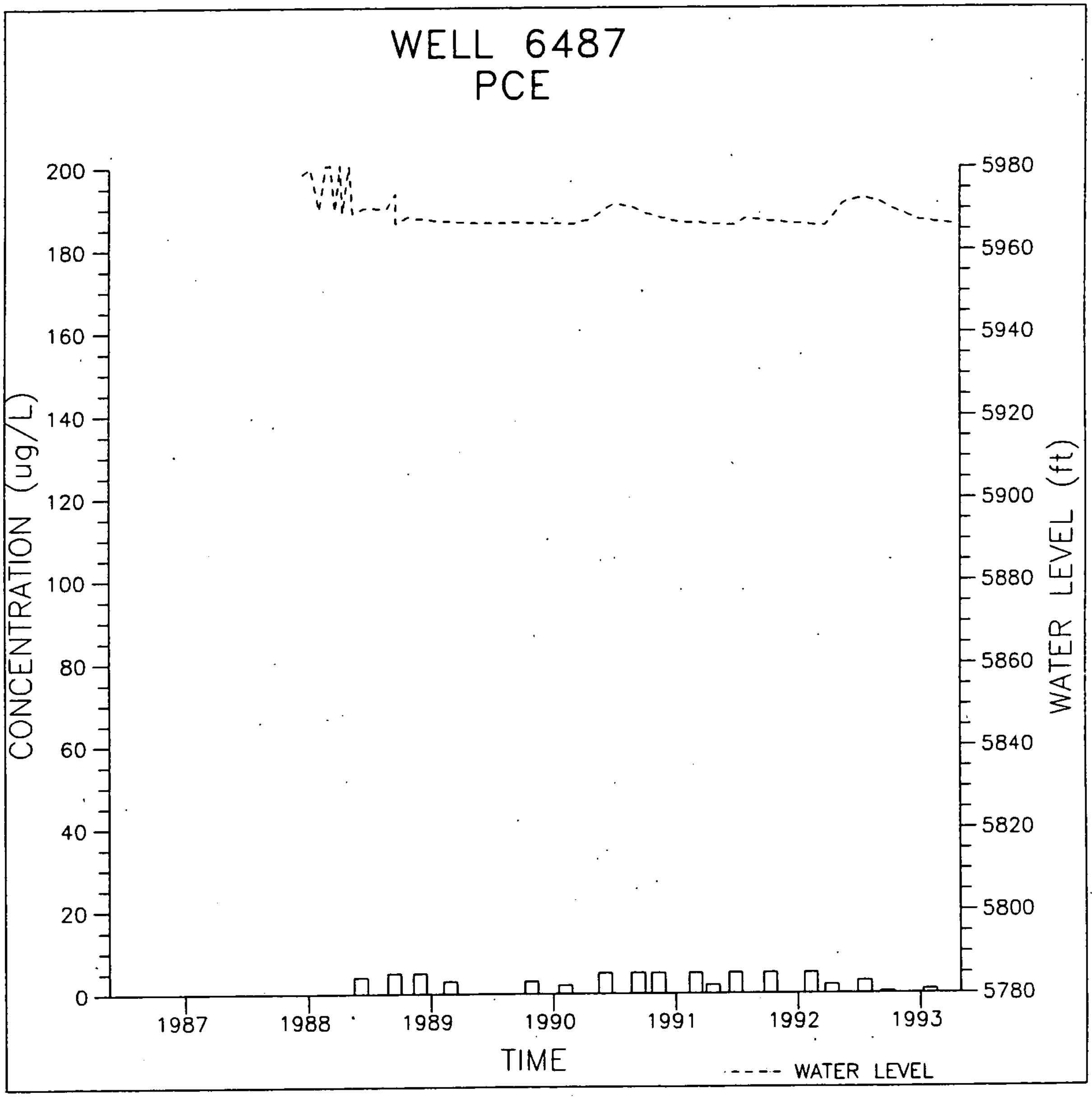
WELL 5587
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

646

447


WELL 5687
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

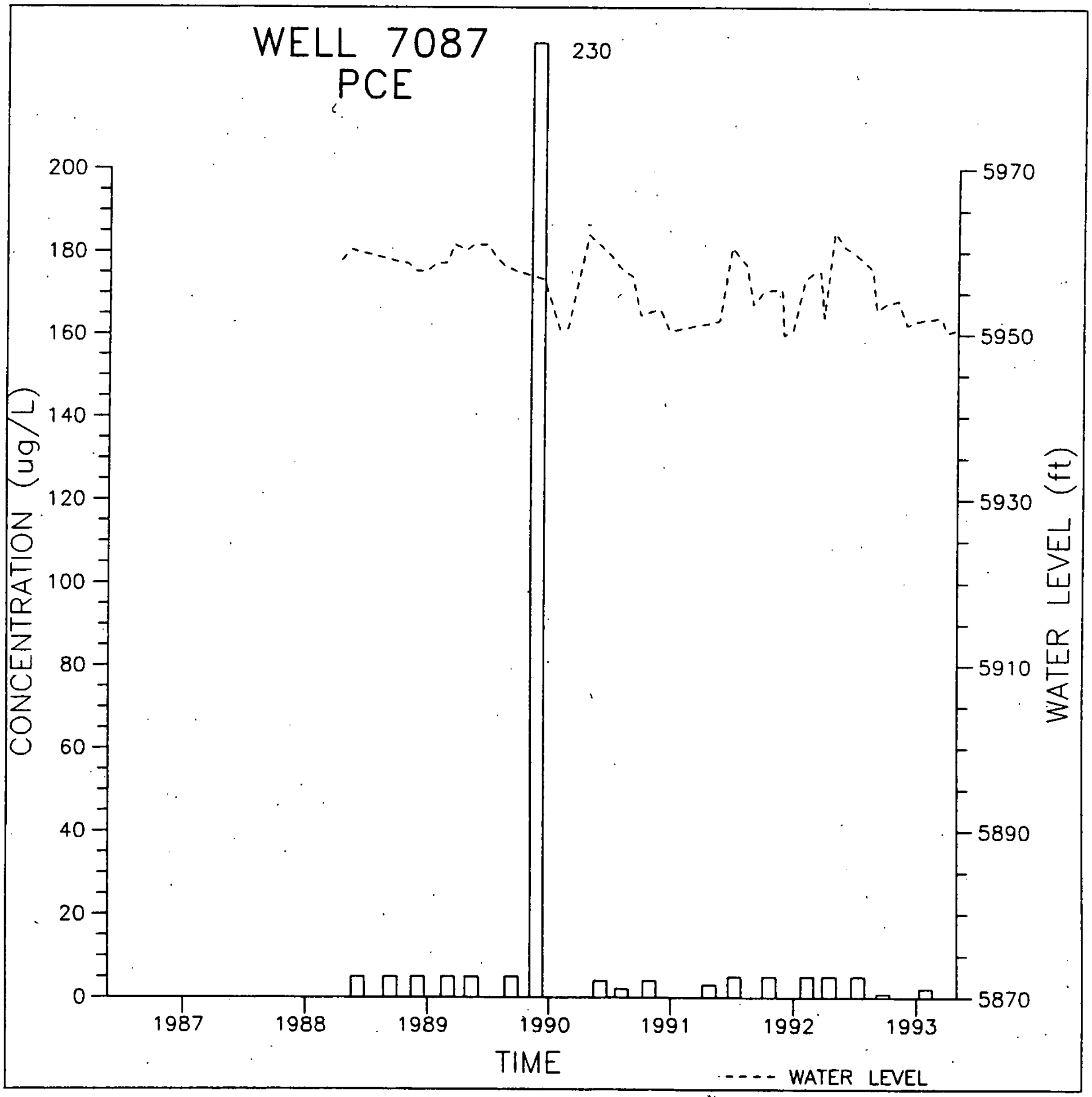
647



WELL 6487
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

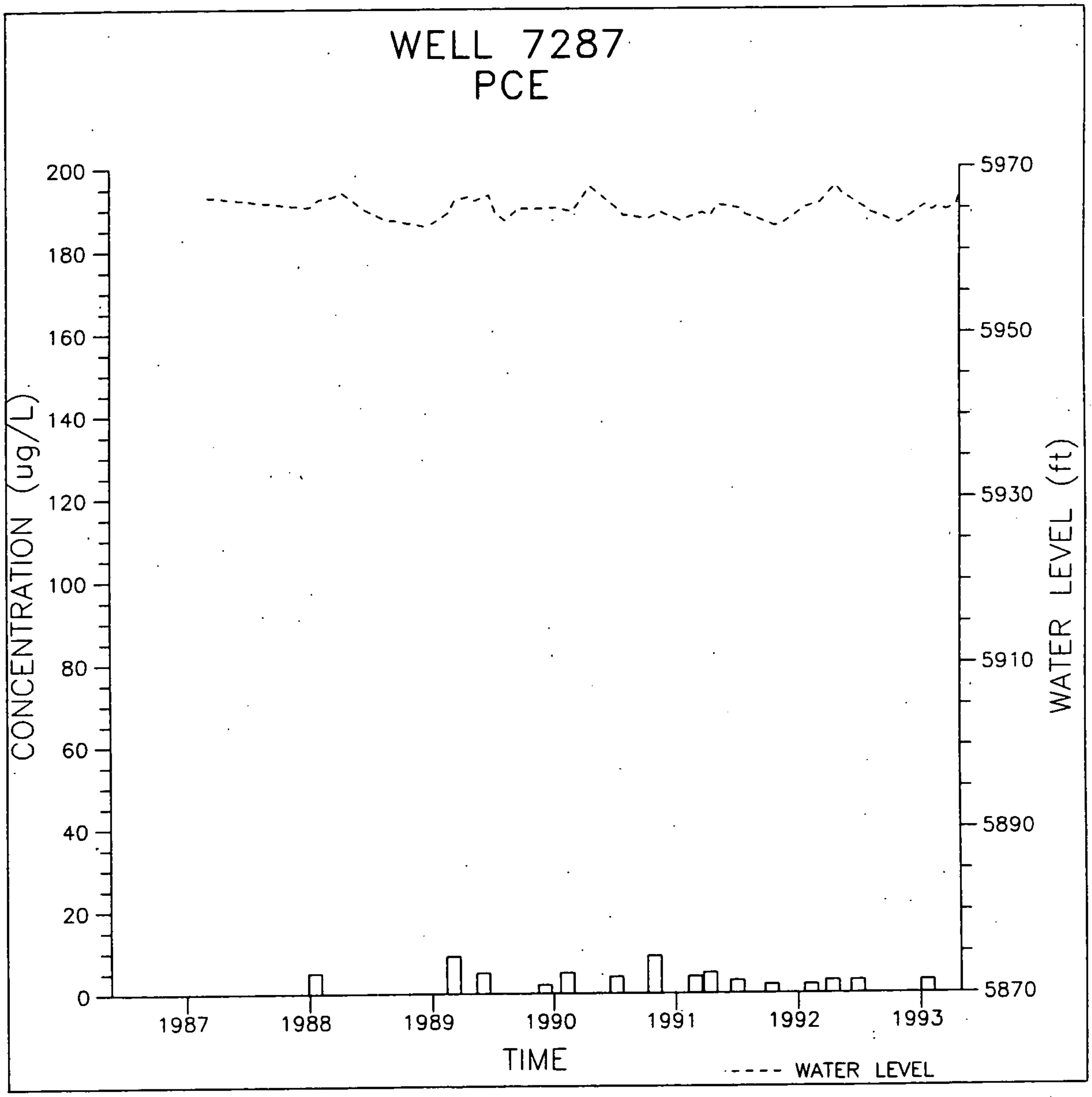
648

449



WELL 7087
PCE
230
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
WATER LEVEL

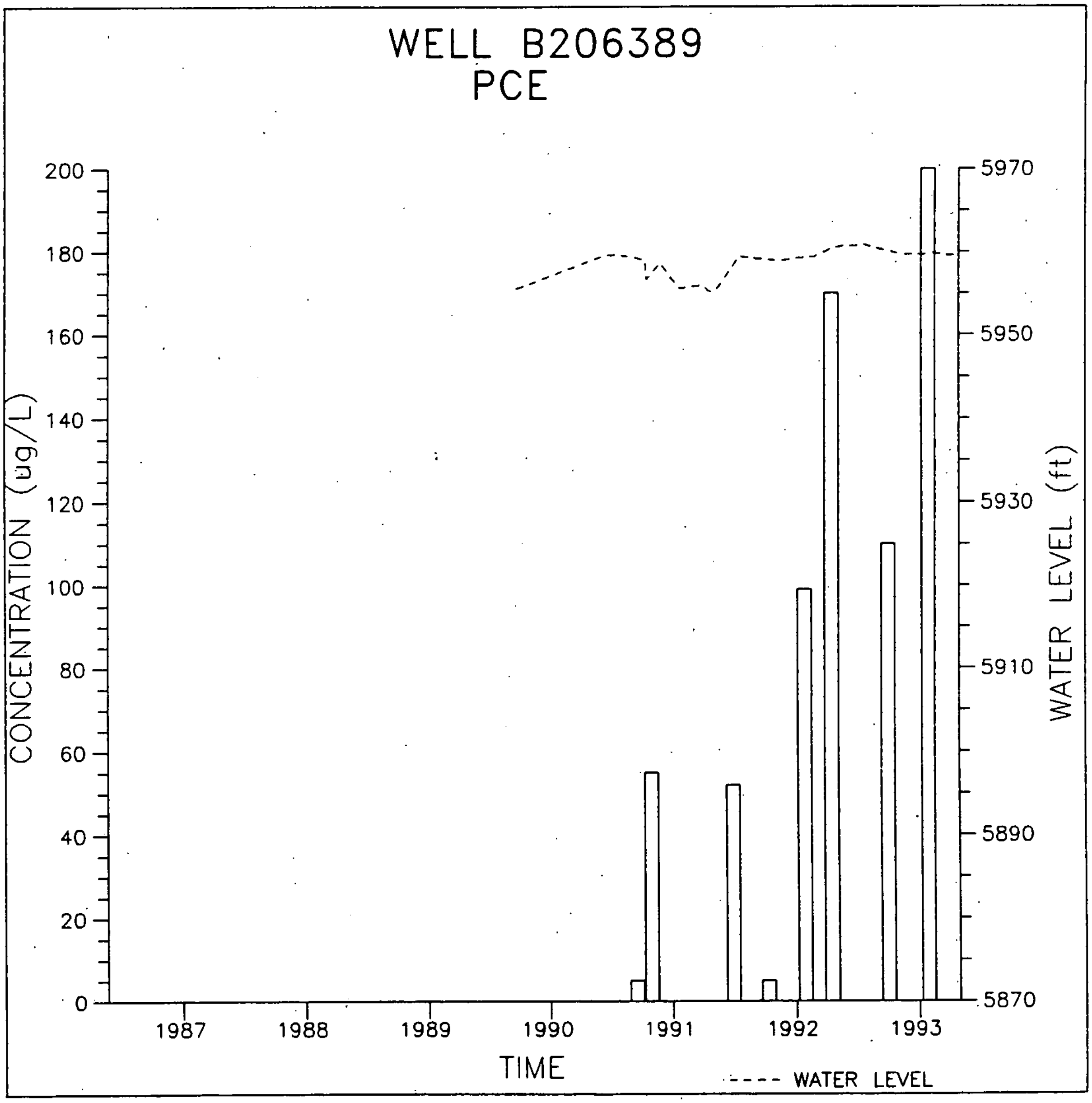
649



WELL 7287
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

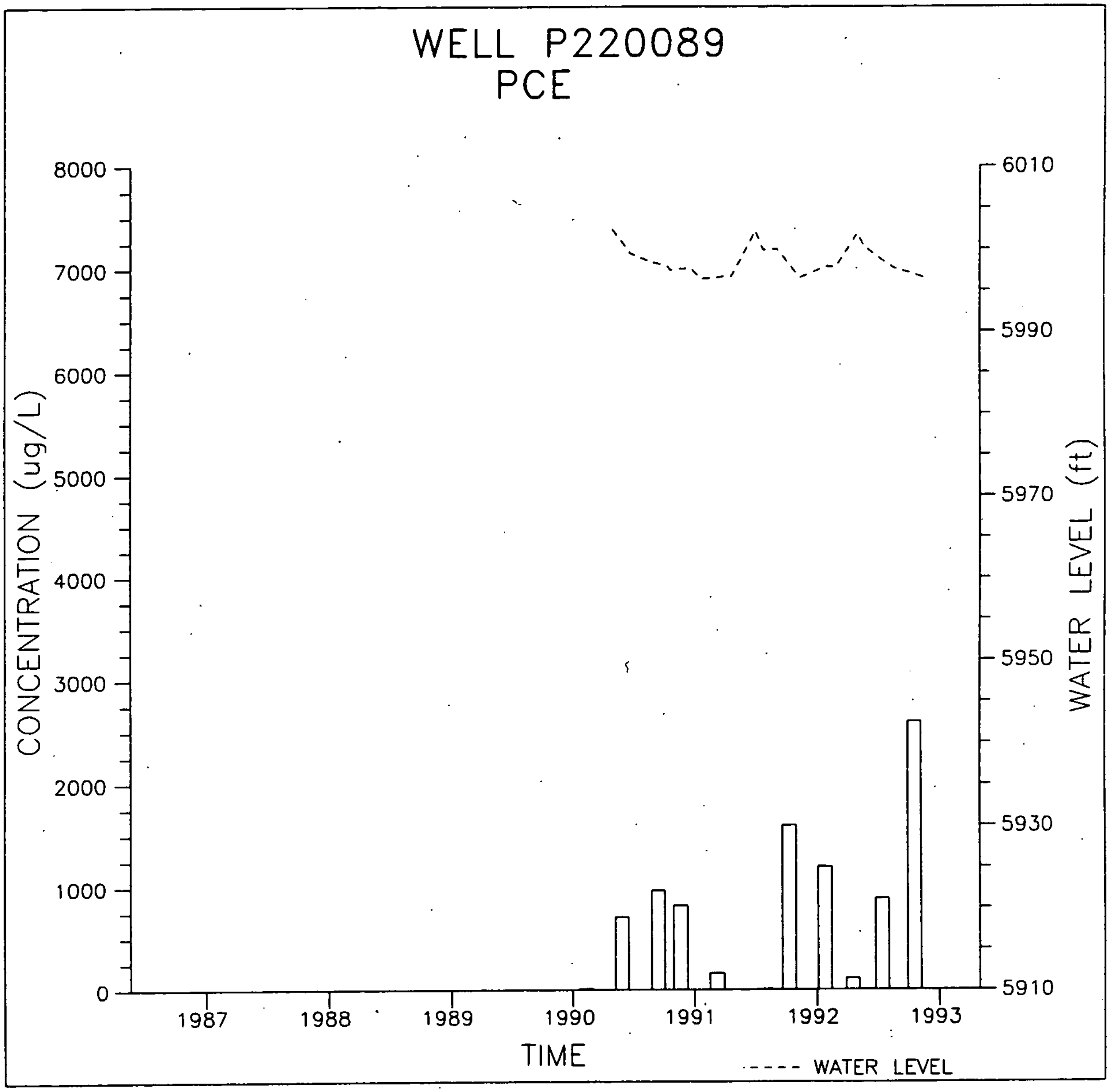
650

657



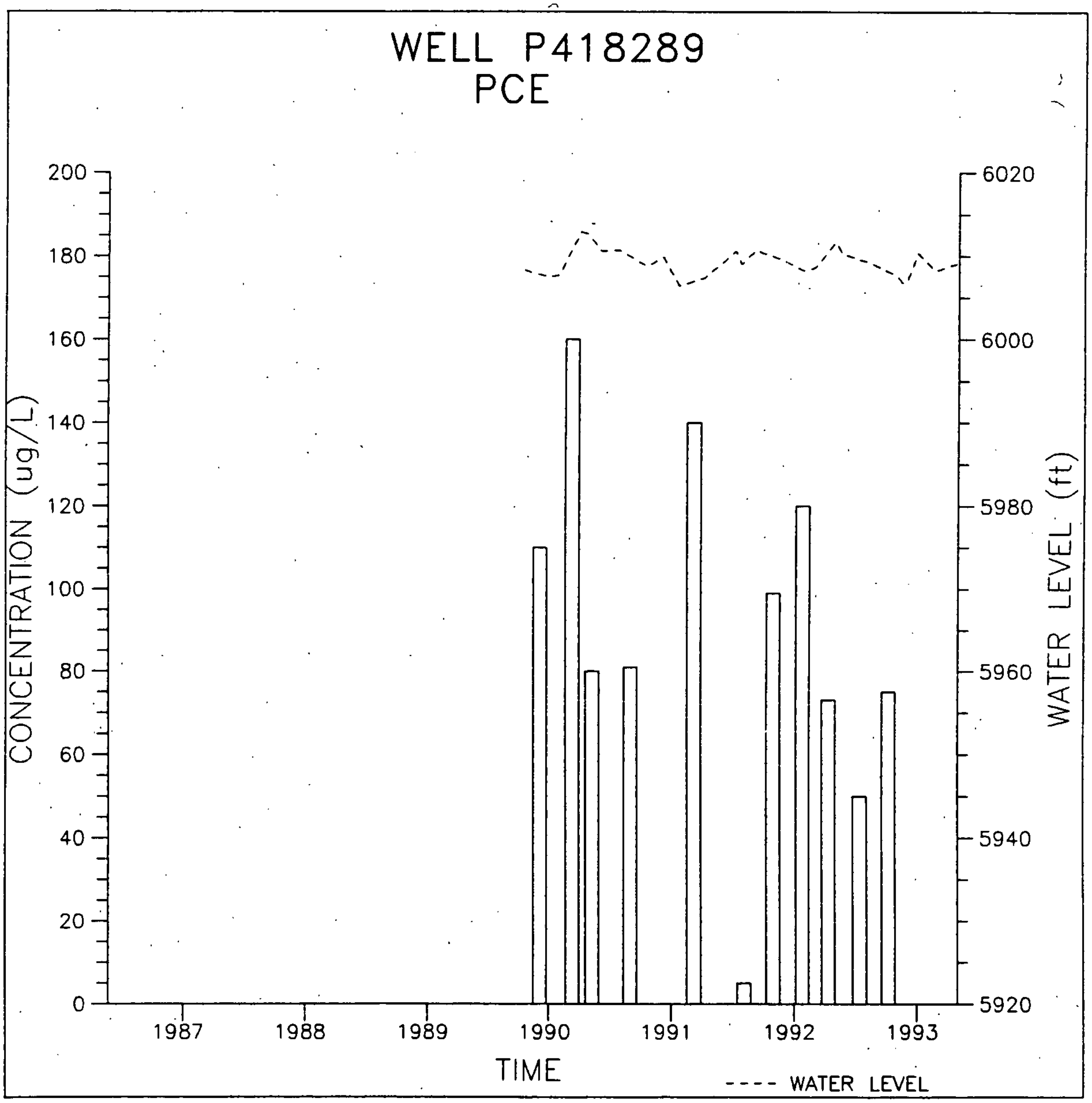
WELL B206389
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

651



WELL P220089
PCE
8000
7000
6000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
6010
5990
5970
5950
5930
5910
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

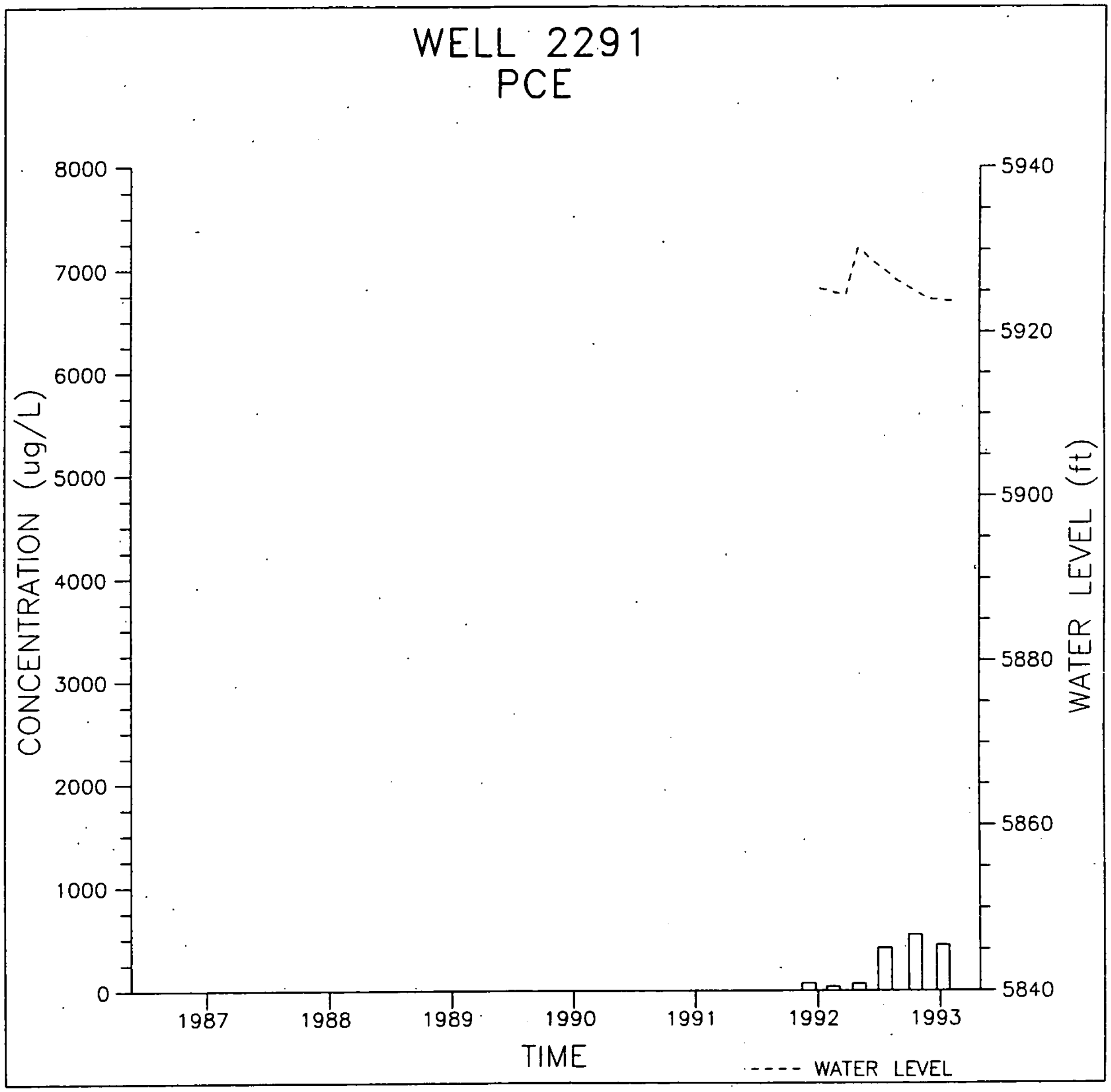
652



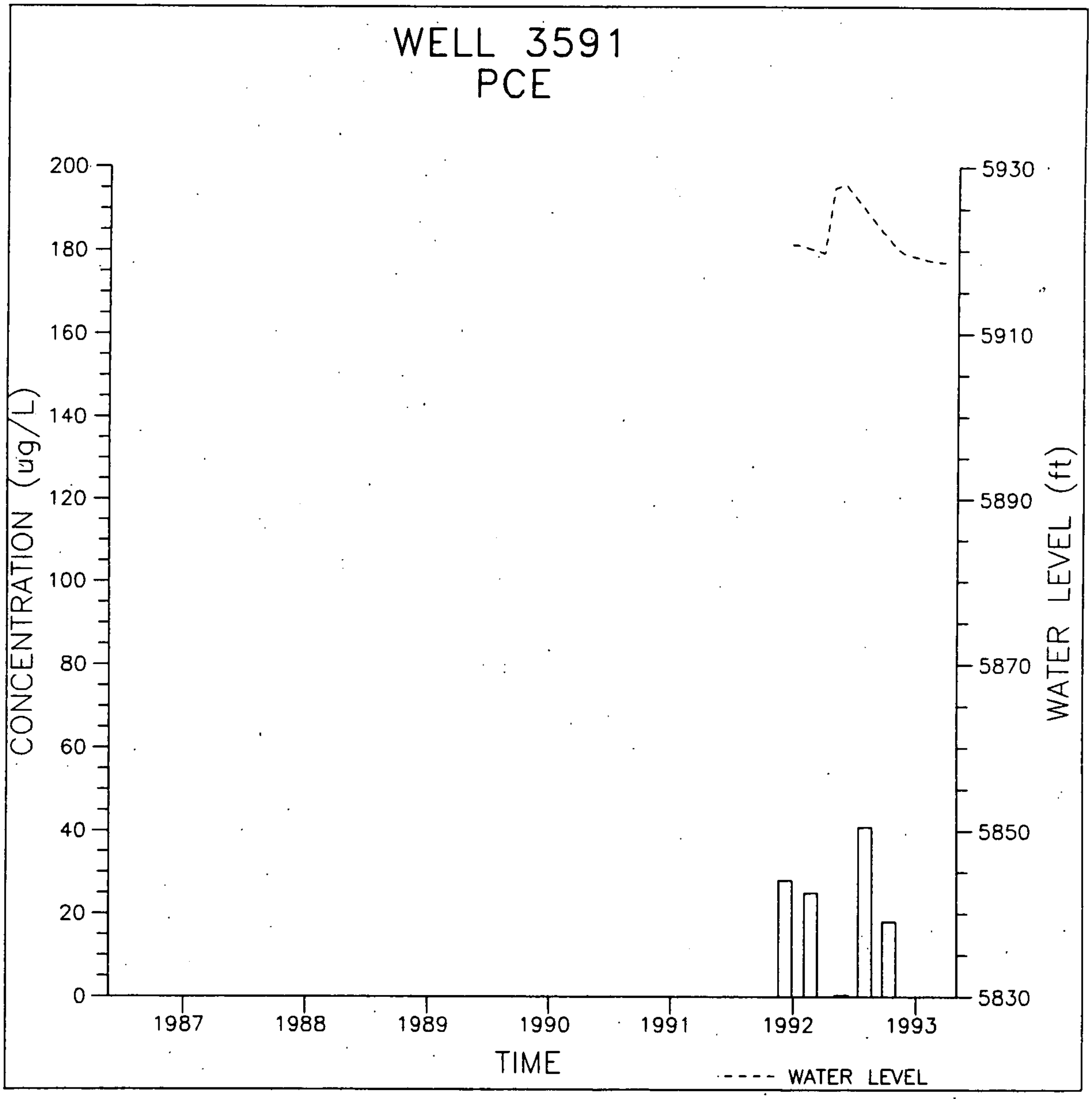
WELL P418289
PCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
200
180
160
140
120
100
80
60
40
20
0
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
---- WATER LEVEL

653

654

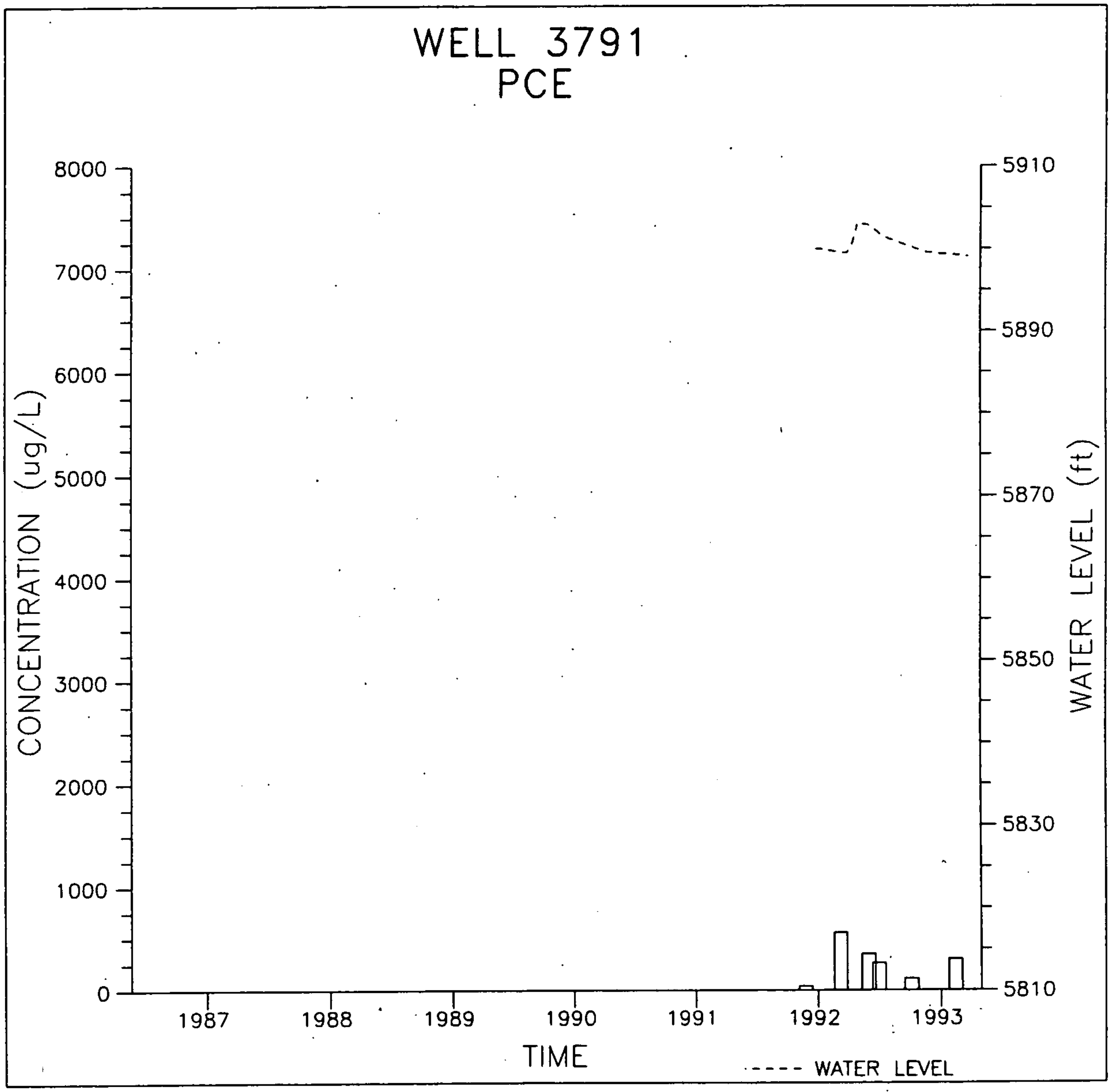

WELL 2291
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

654



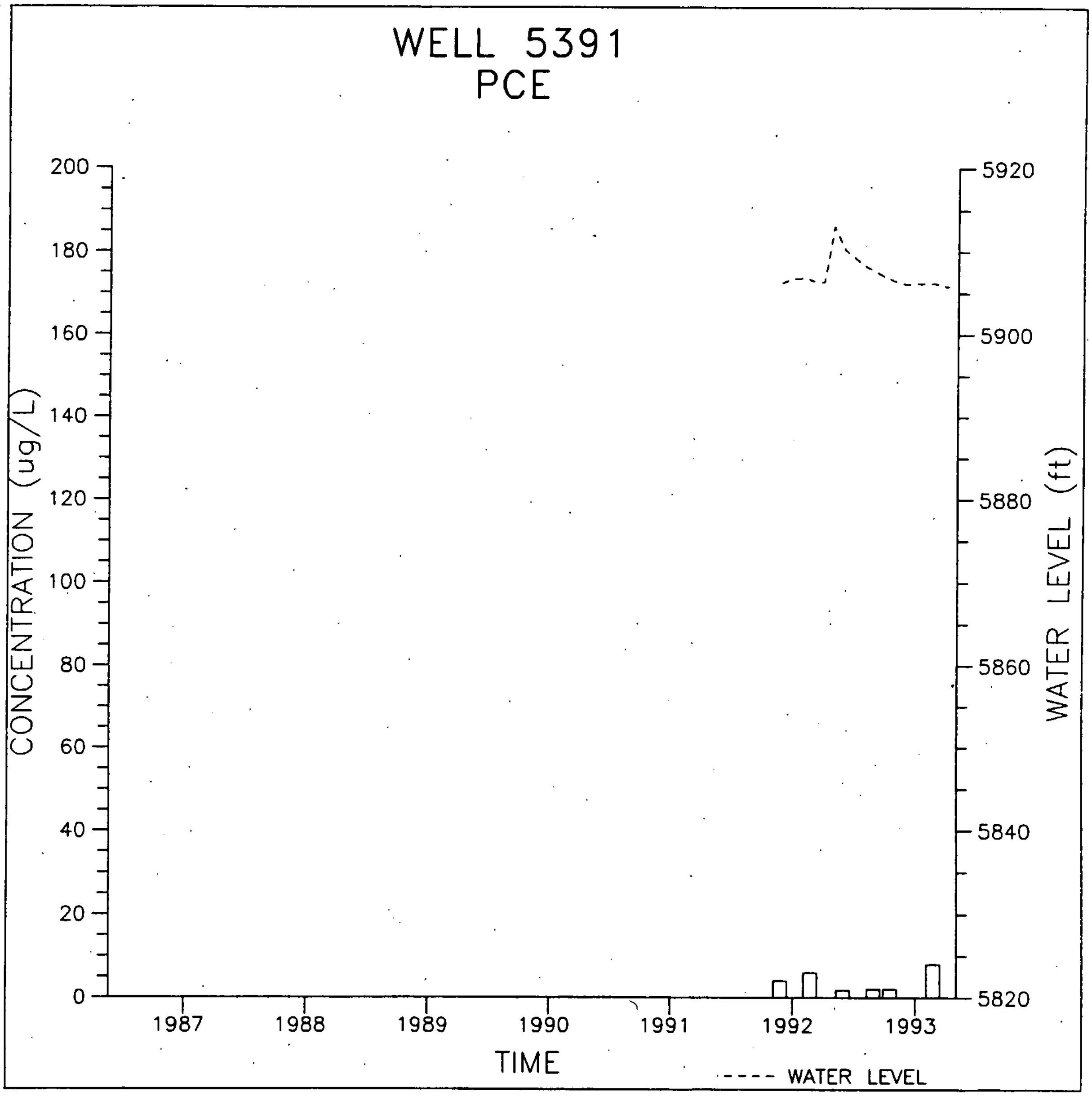
WELL 3591
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

655


WELL 3791
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

656

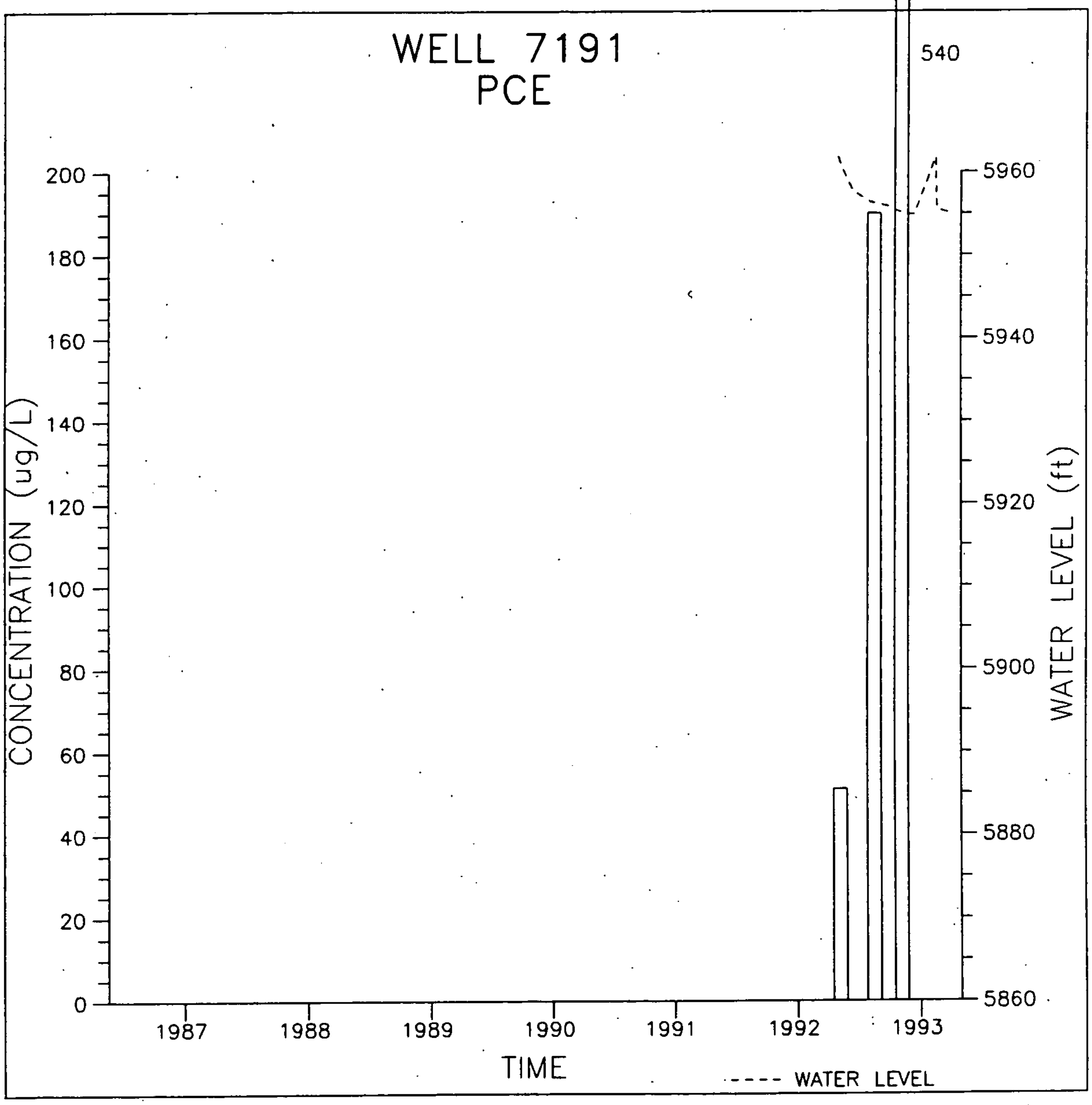
657



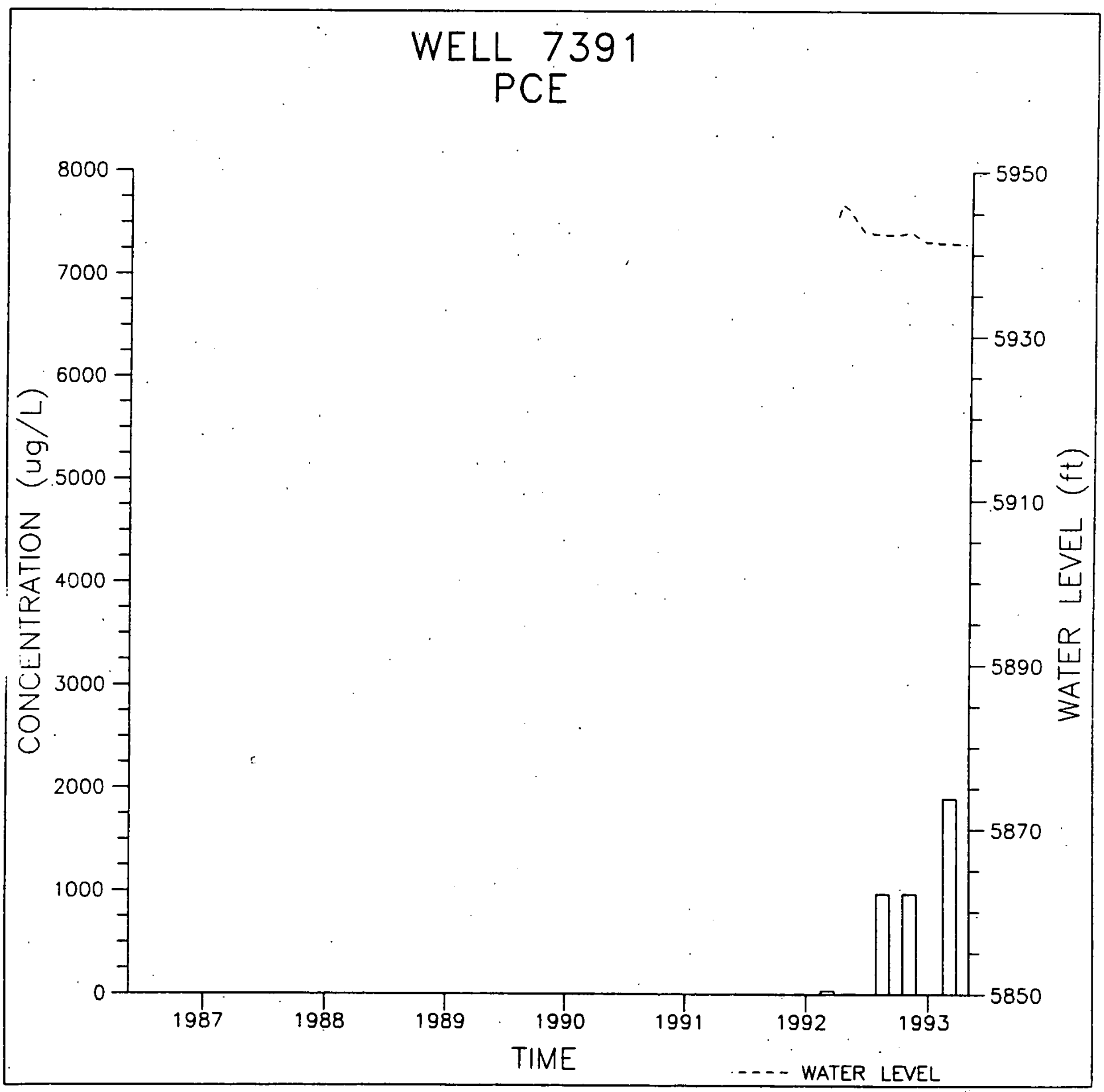
WELL 5391
PCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

657

658


WELL 7191
PCE
540
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5960
5940
5920
5900
5880
5860
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

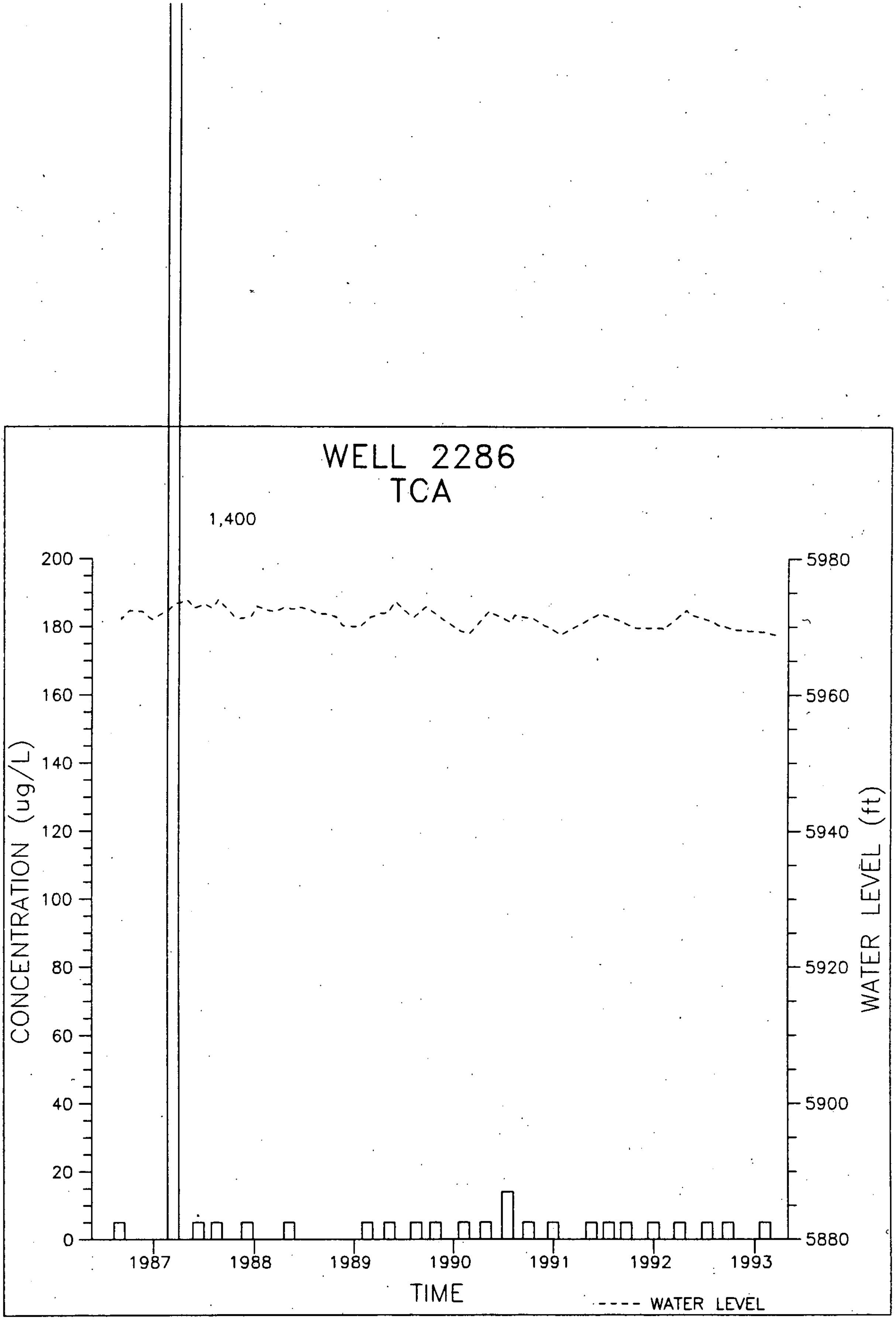
658



WELL 7391
PCE
CONCENTRATION (ug/L)
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

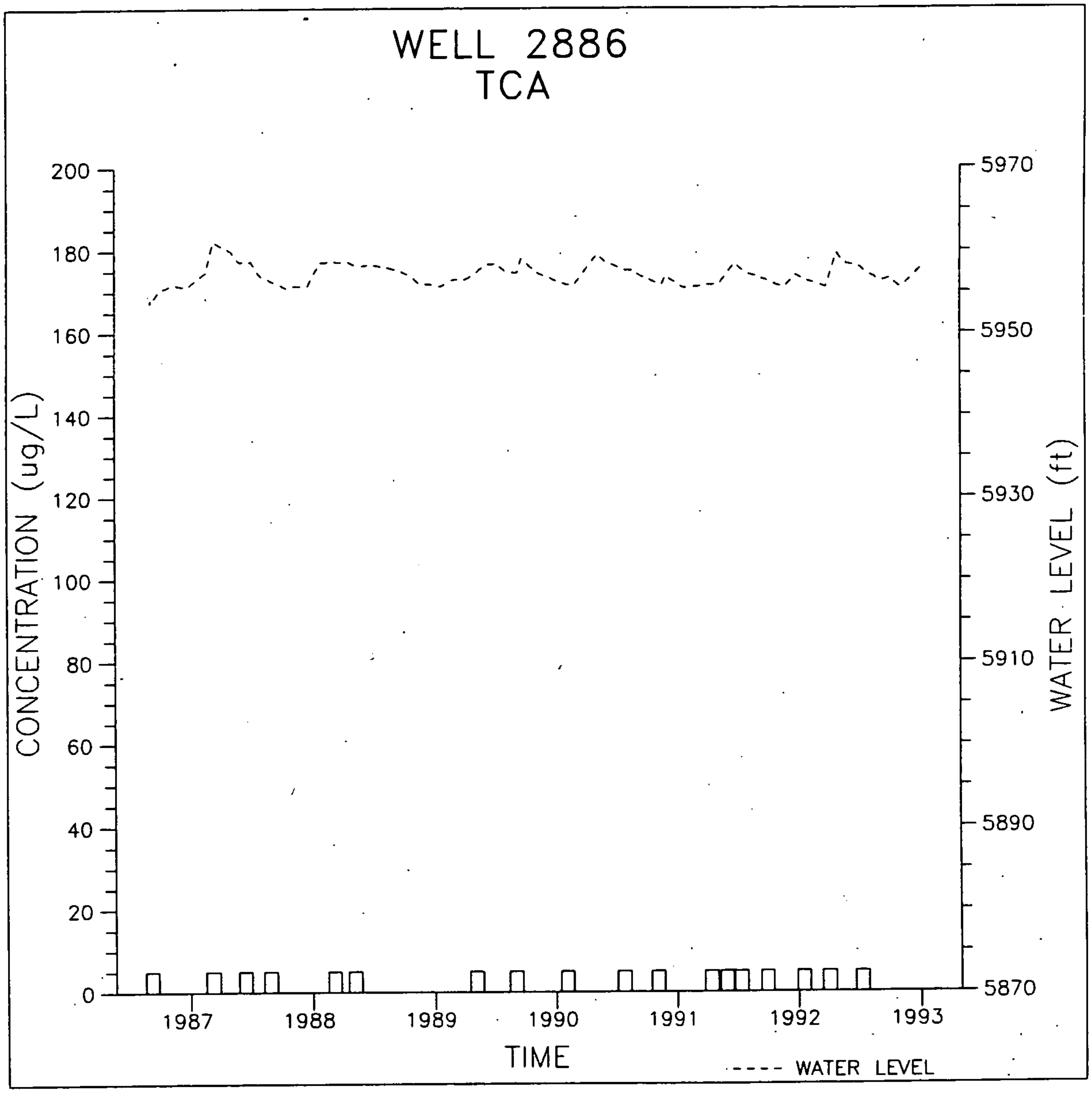
659

650

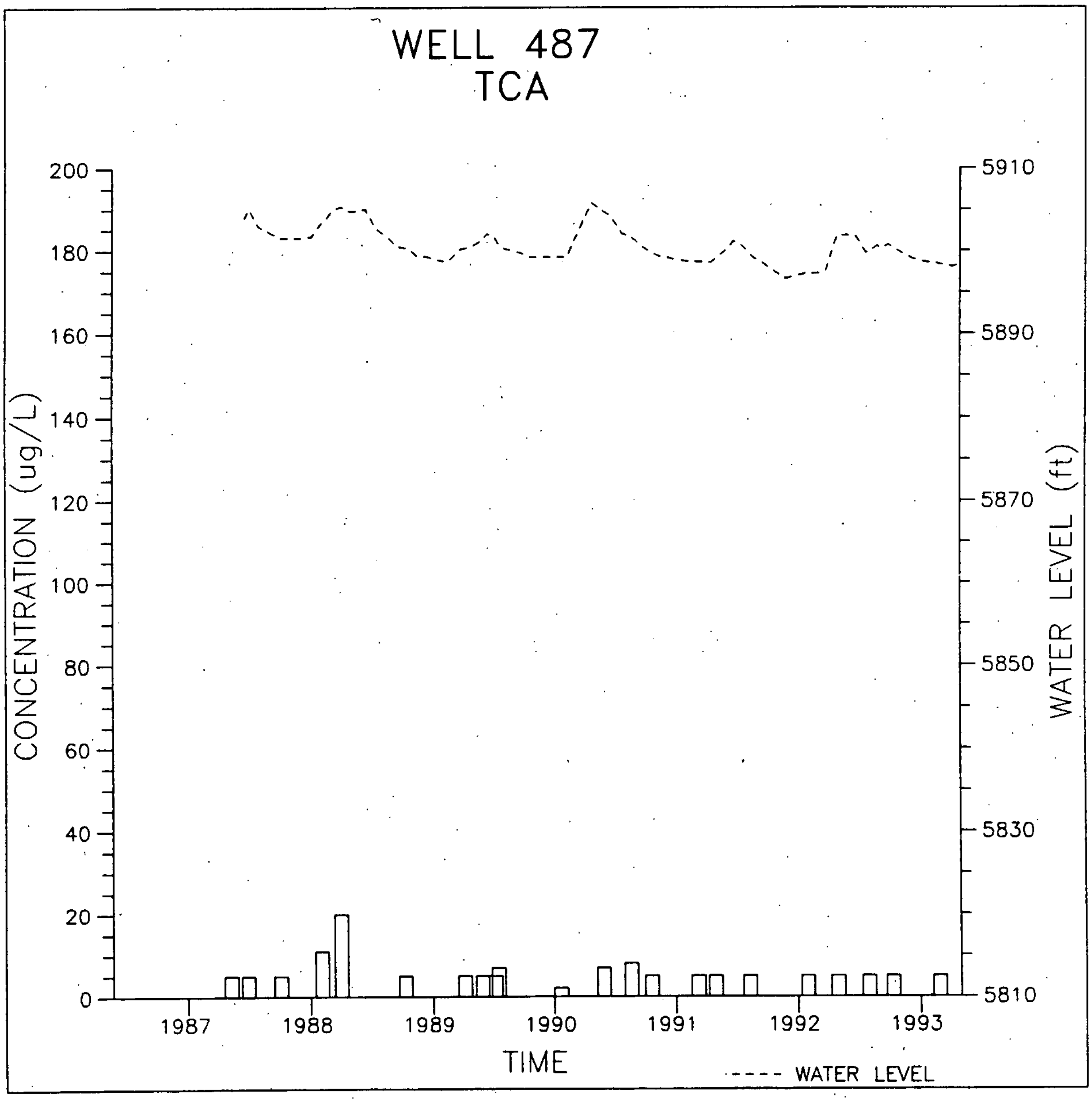


WELL 2286
TCA
1,400
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

660

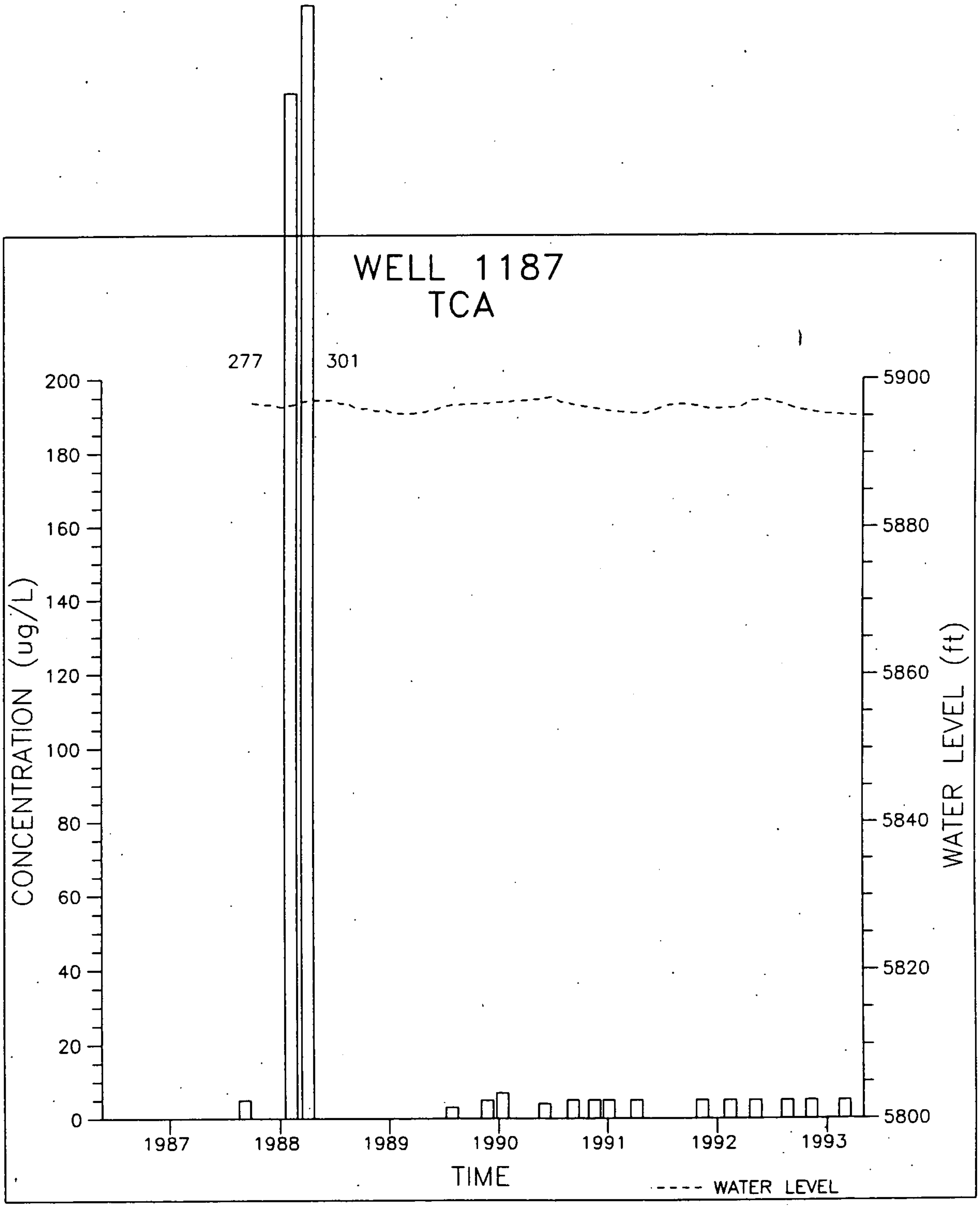

WELL 2886
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

661



WELL 487
TCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

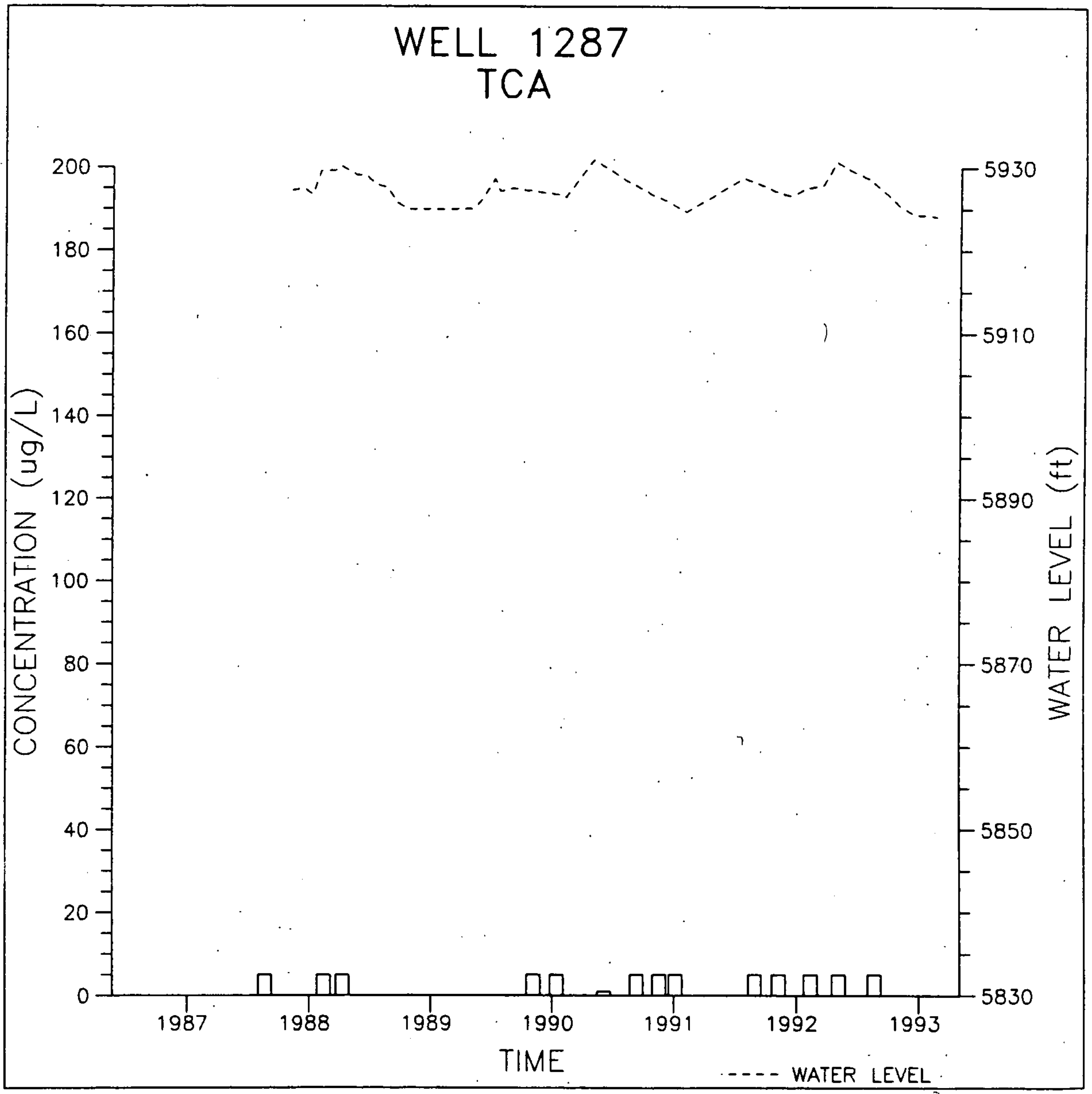
662



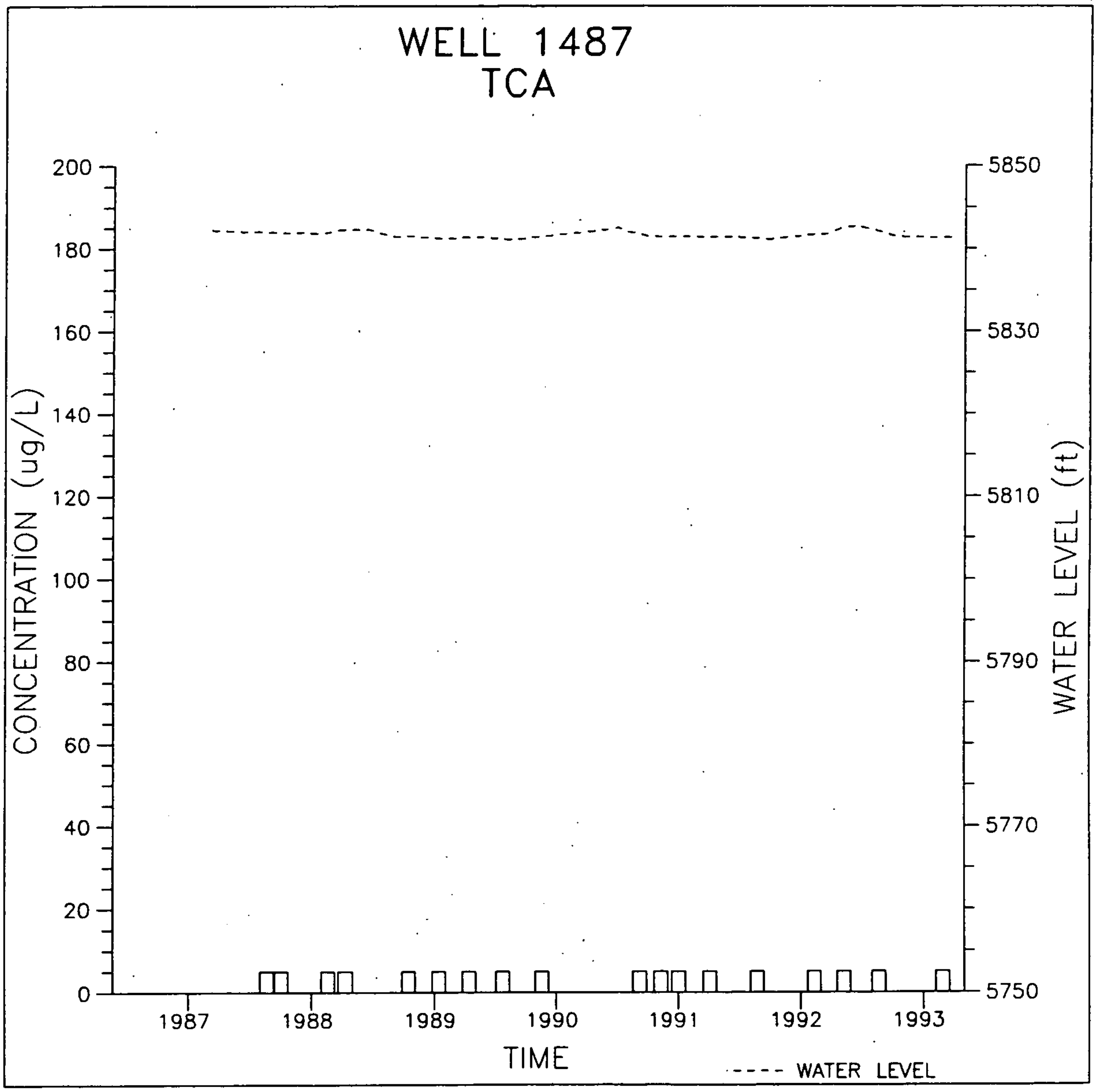
WELL 1187
TCA
277
301
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5800
5820
5840
5860
5880
5900
1987
1988
1989
1990
1991
1992
1993

663

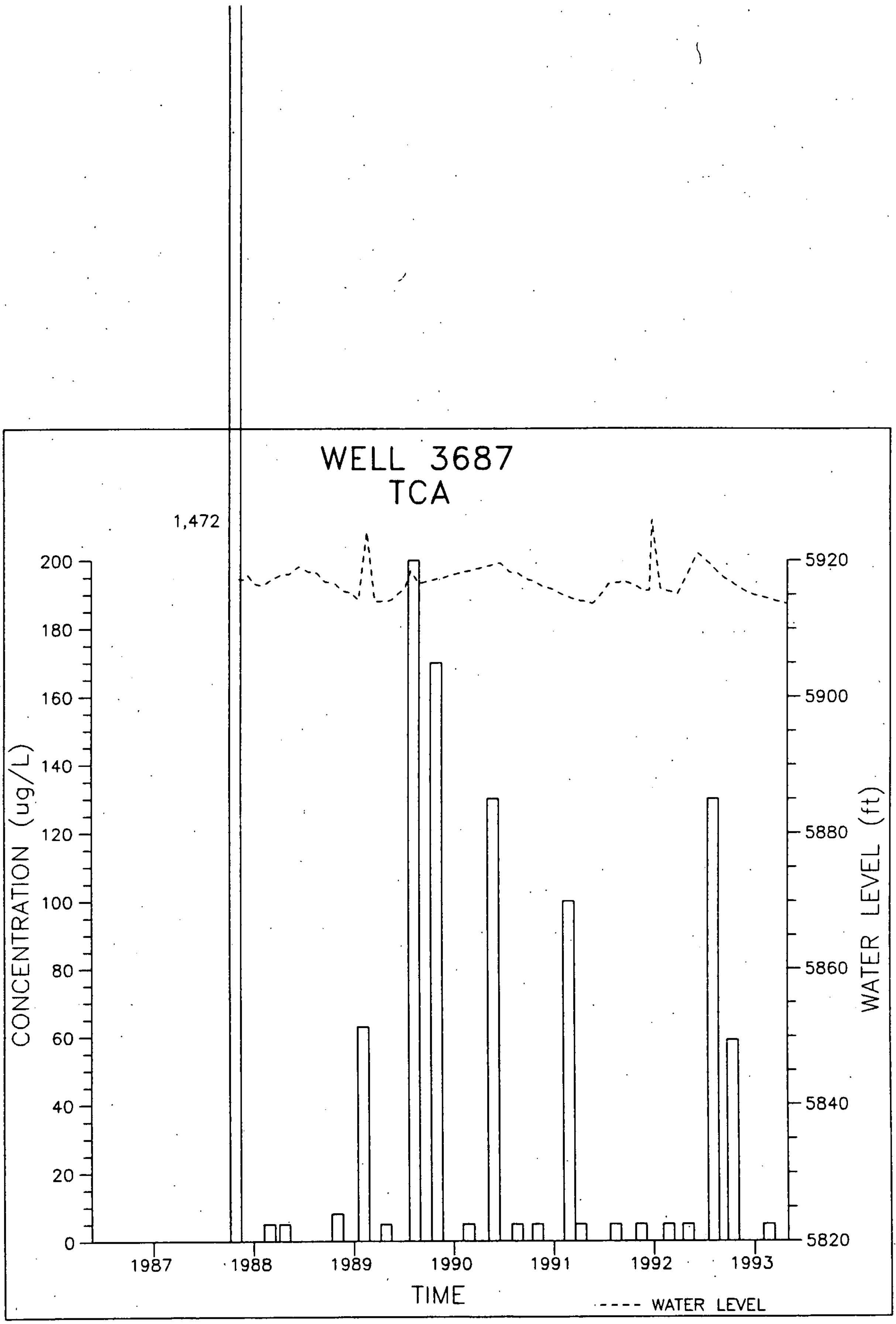
654


WELL 1287
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

664


WELL 1487
TCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

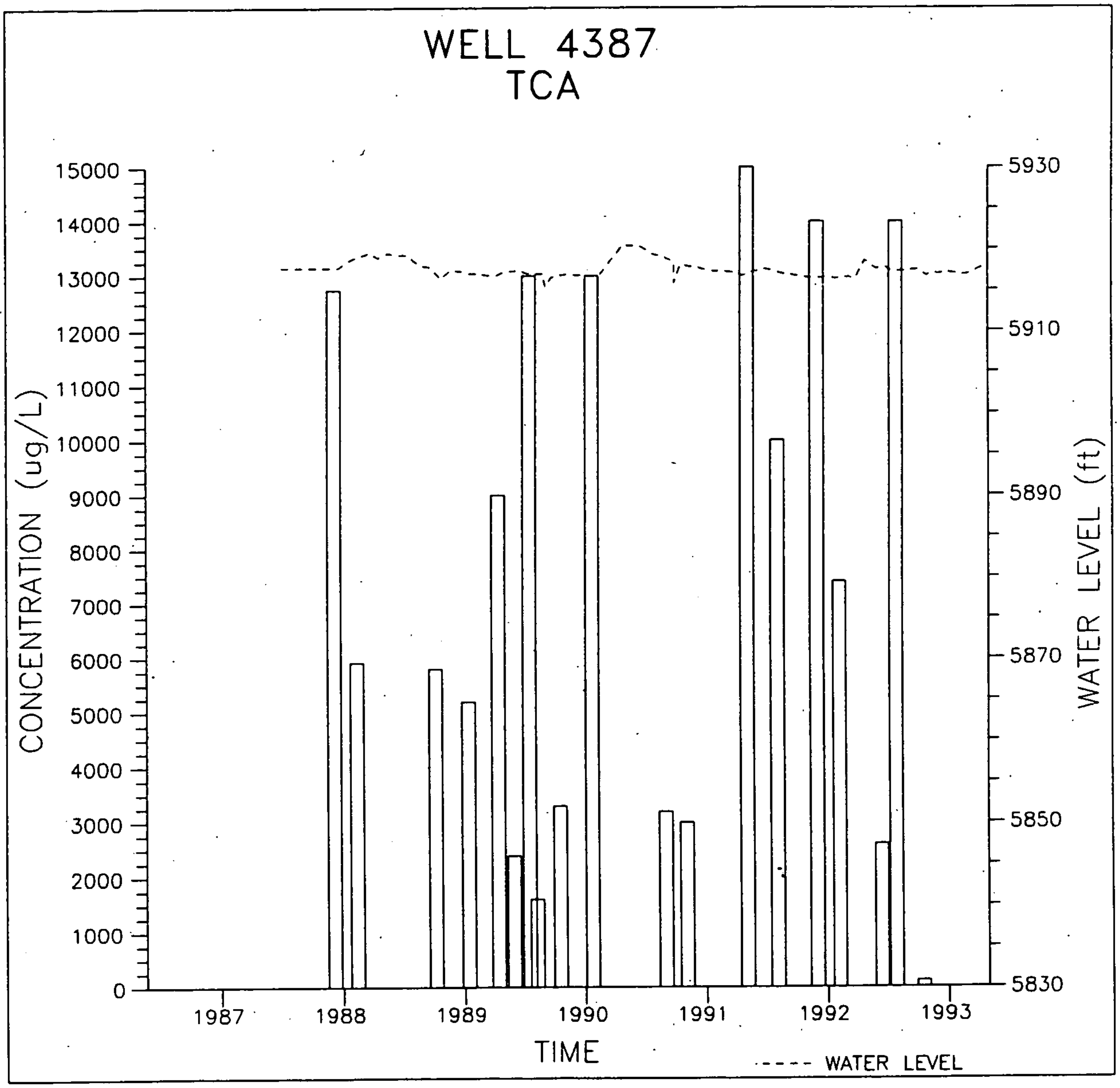
665



WELL 3687
TCA
1,472
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5920
5900
5880
5860
5840
5820
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

666

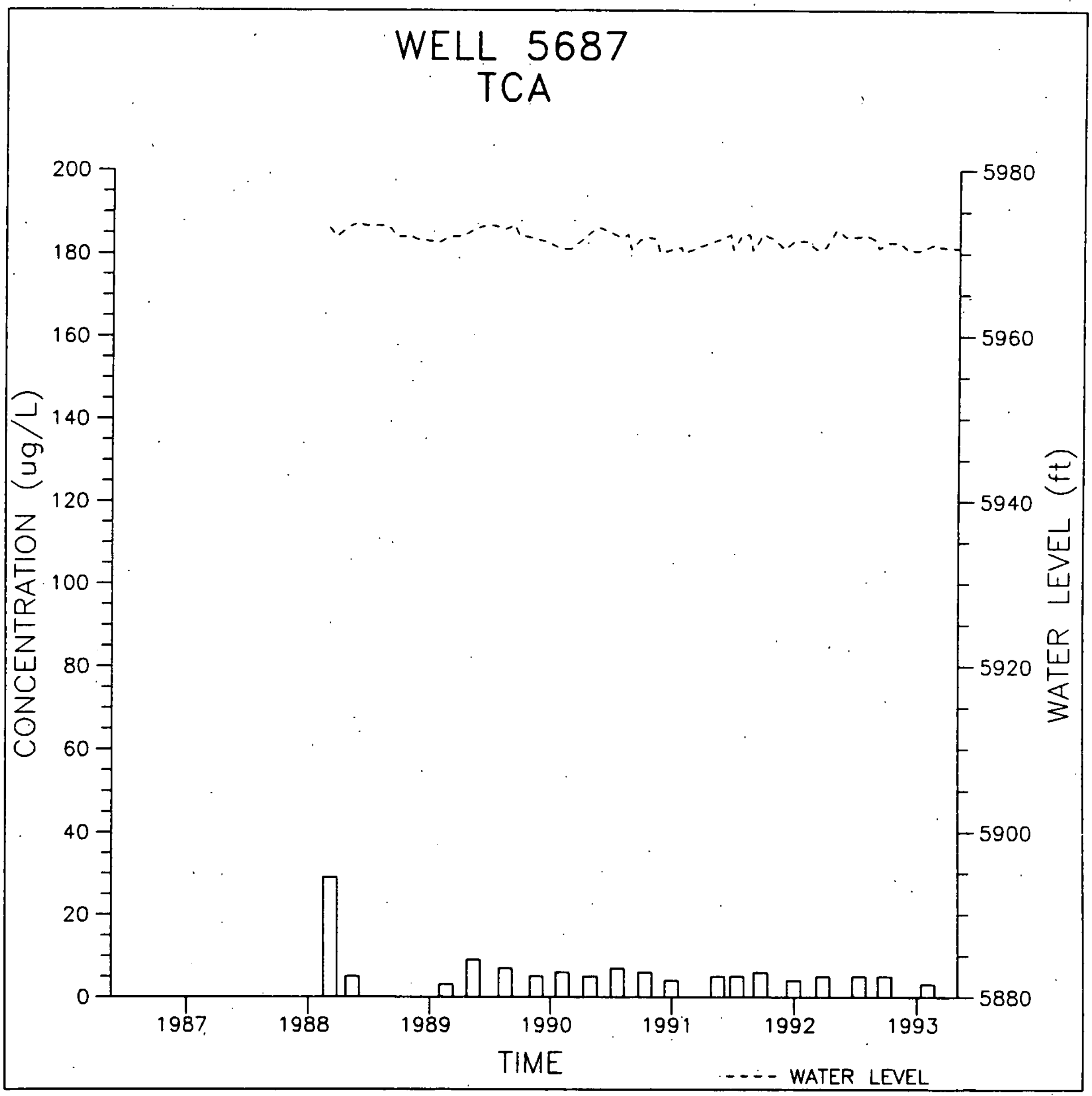
667



WELL 4387
TCA
CONCENTRATION (ug/L)
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

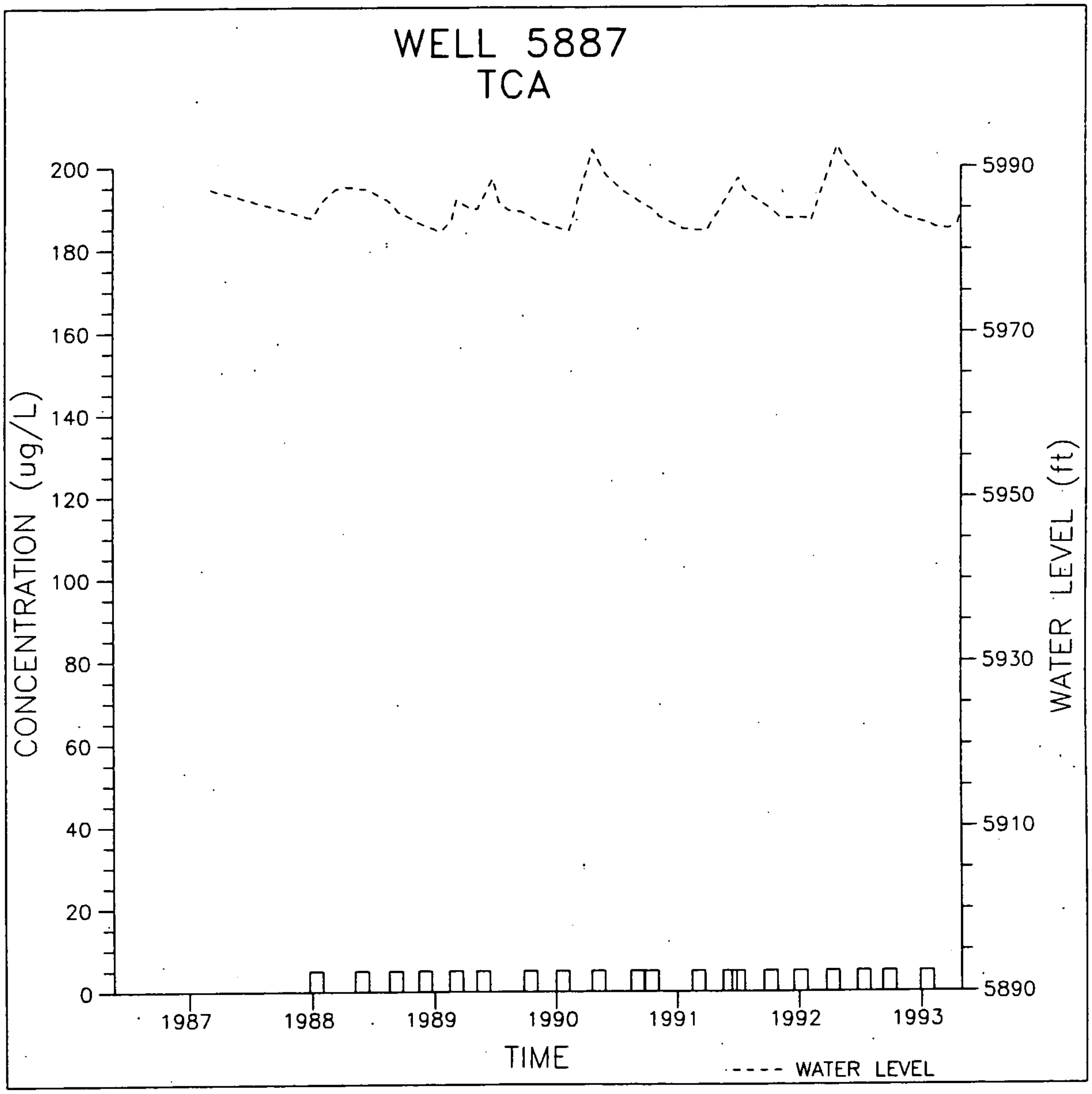
667

668


WELL 5687
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

668

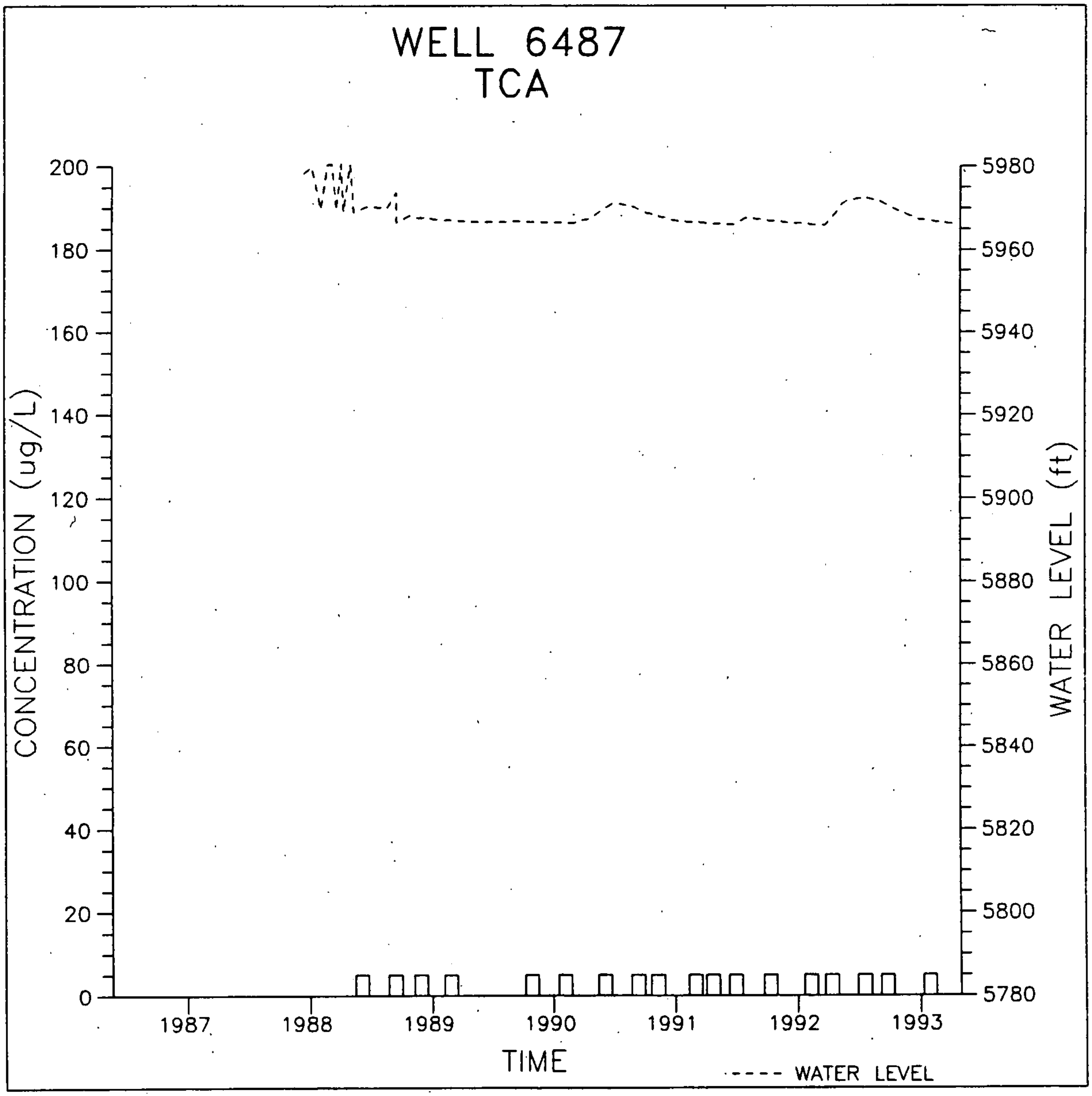
669



WELL 5887
TCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

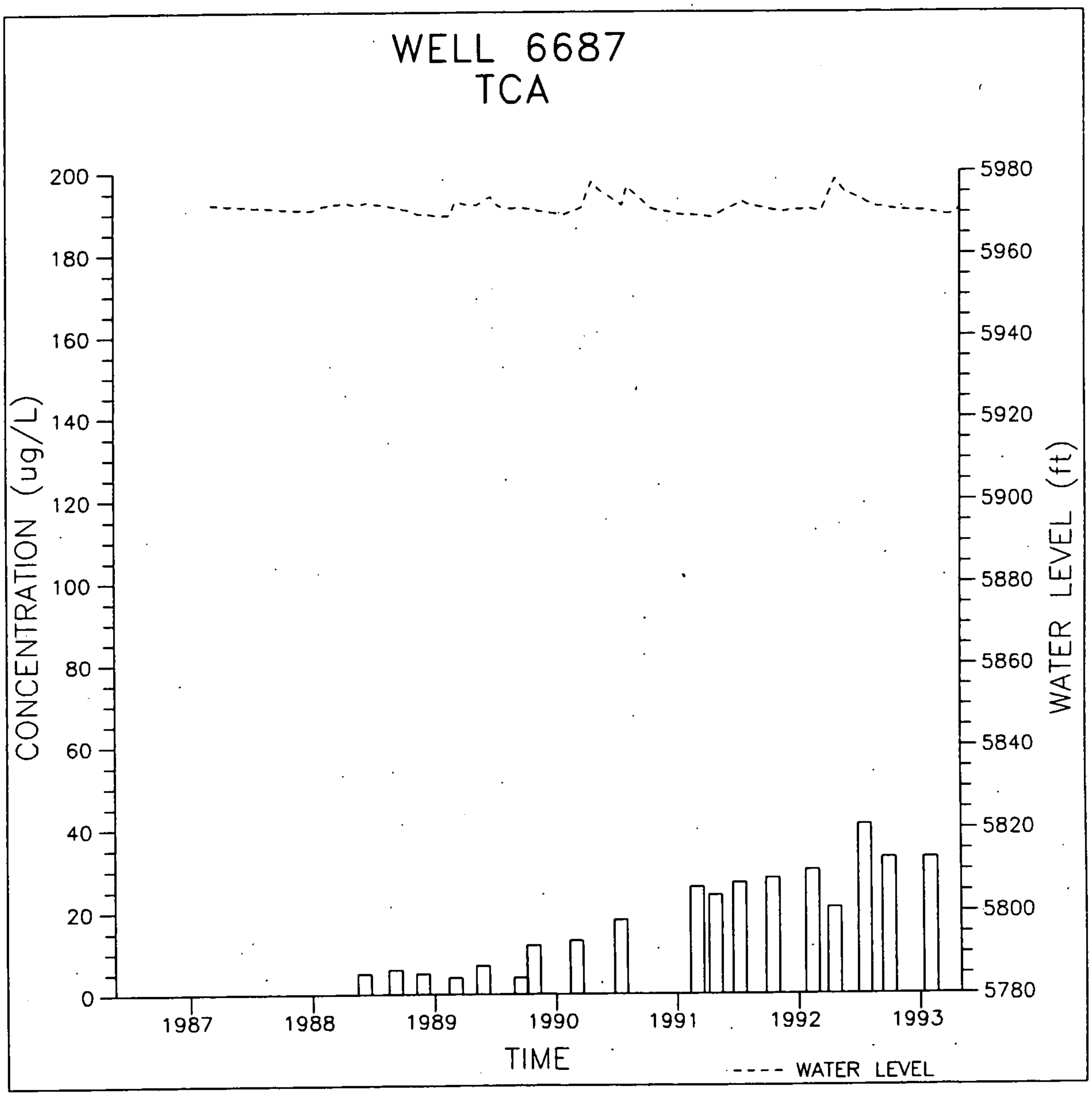
669

680

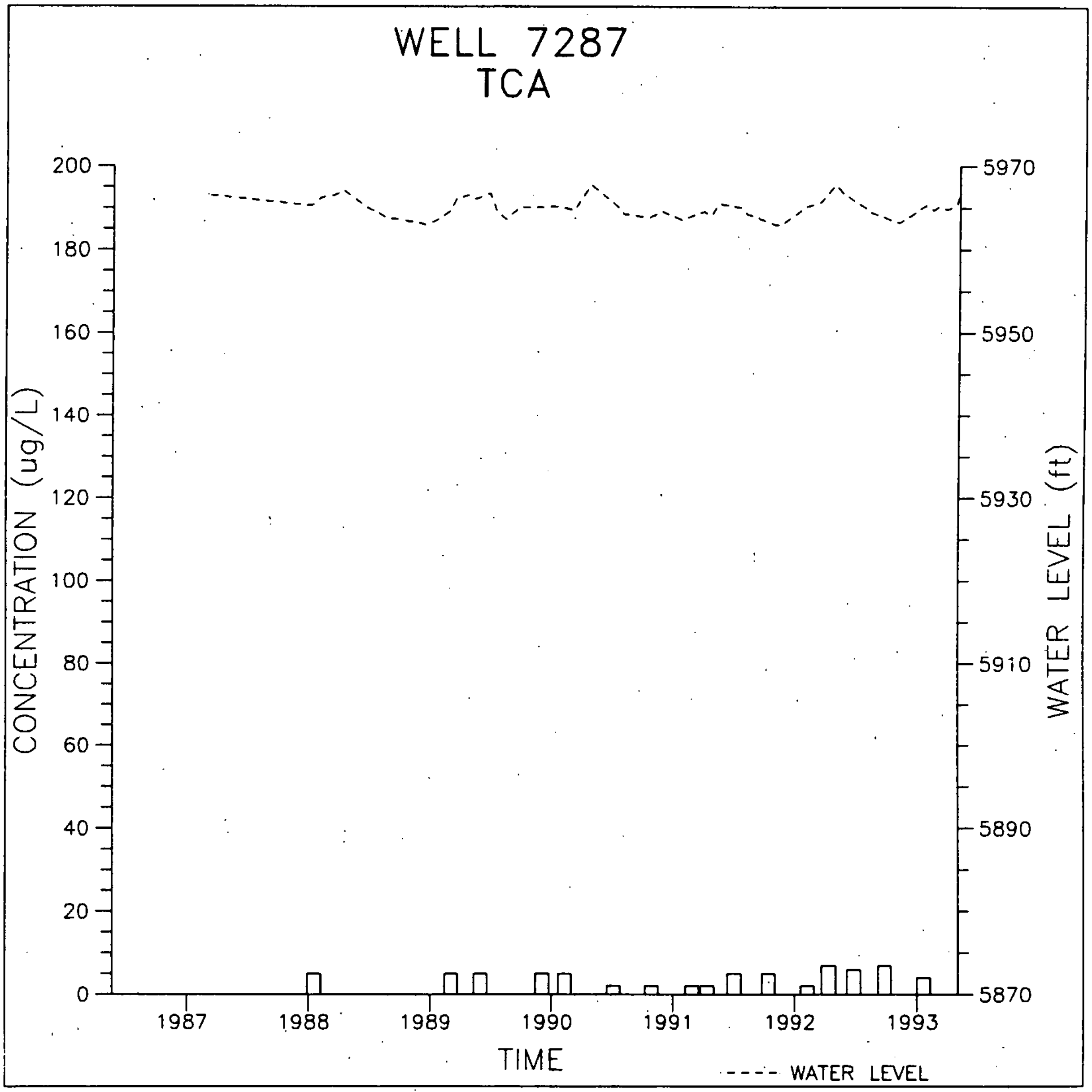

WELL 6487
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

670

671


WELL 6687
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

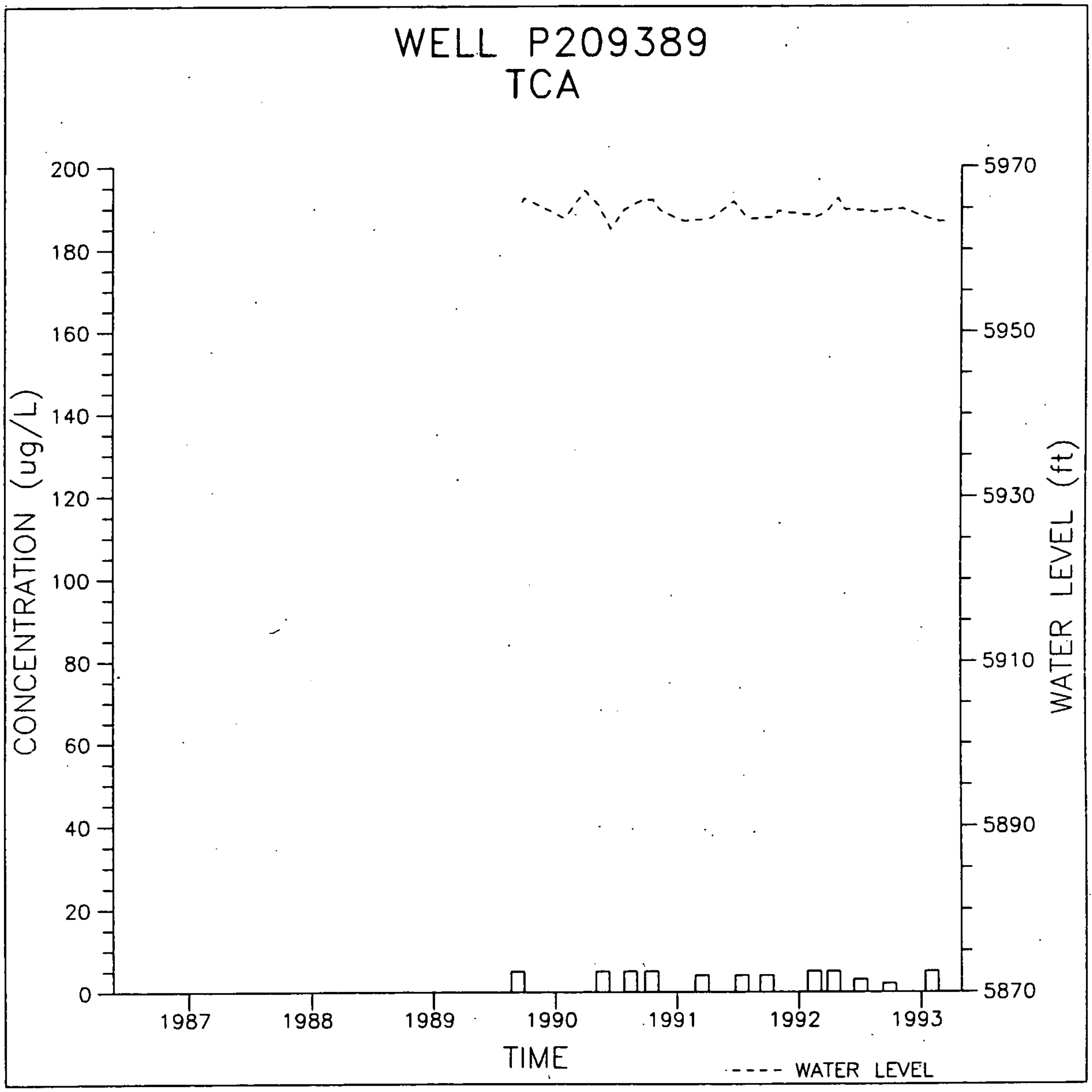
671



WELL 7287
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

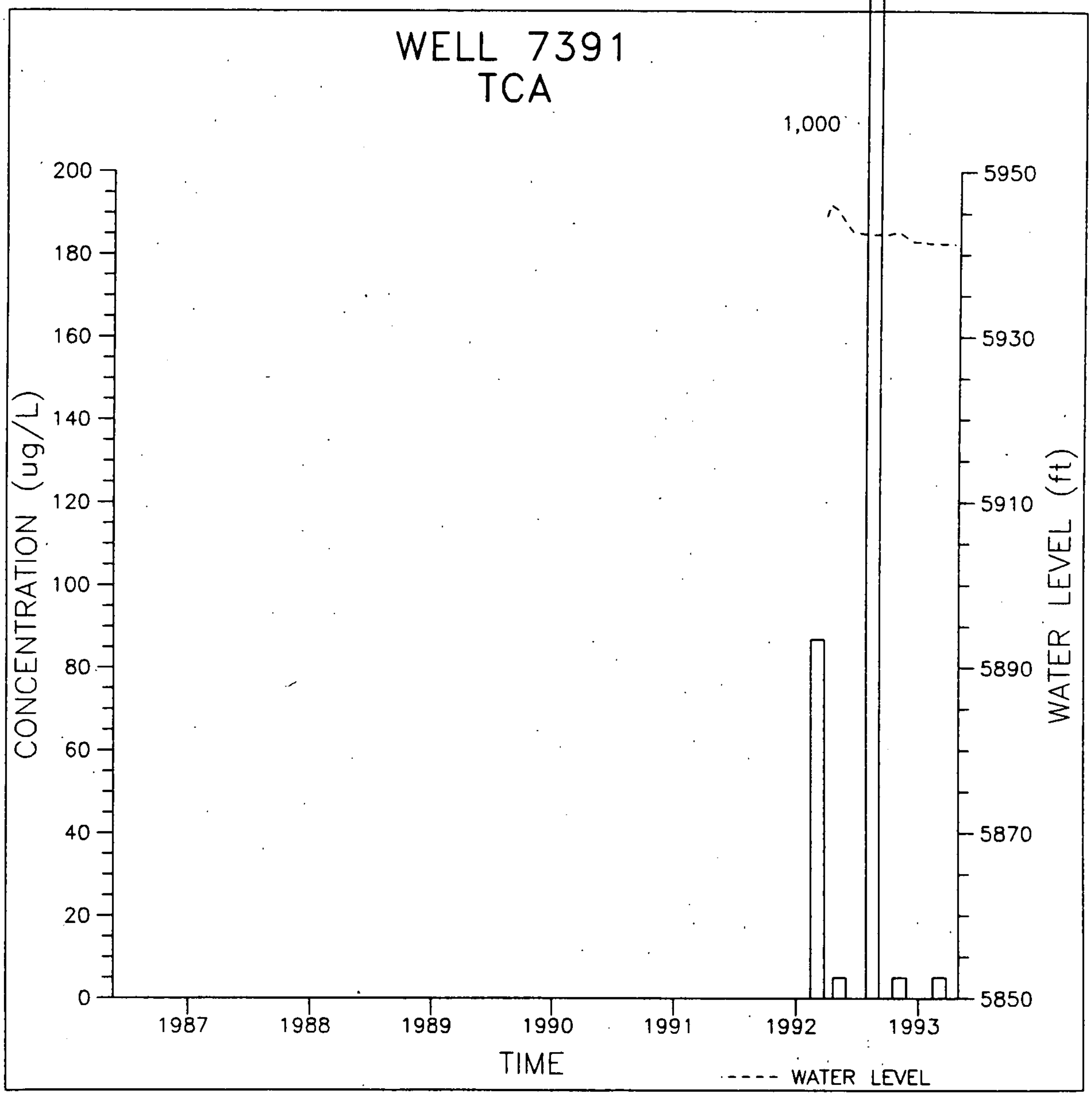
672

623


WELL P209389
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

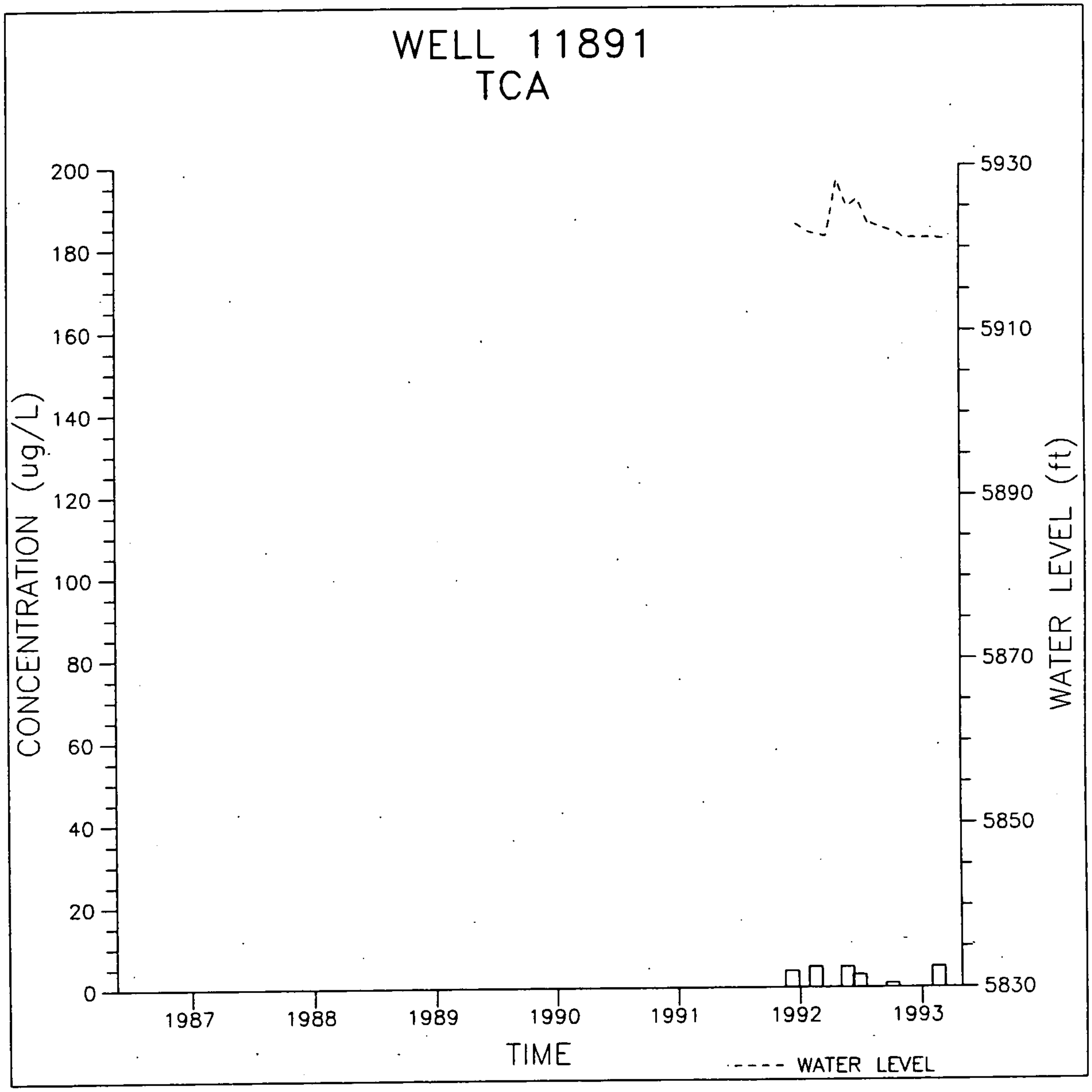
673

694


WELL 7391
TCA
1,000
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

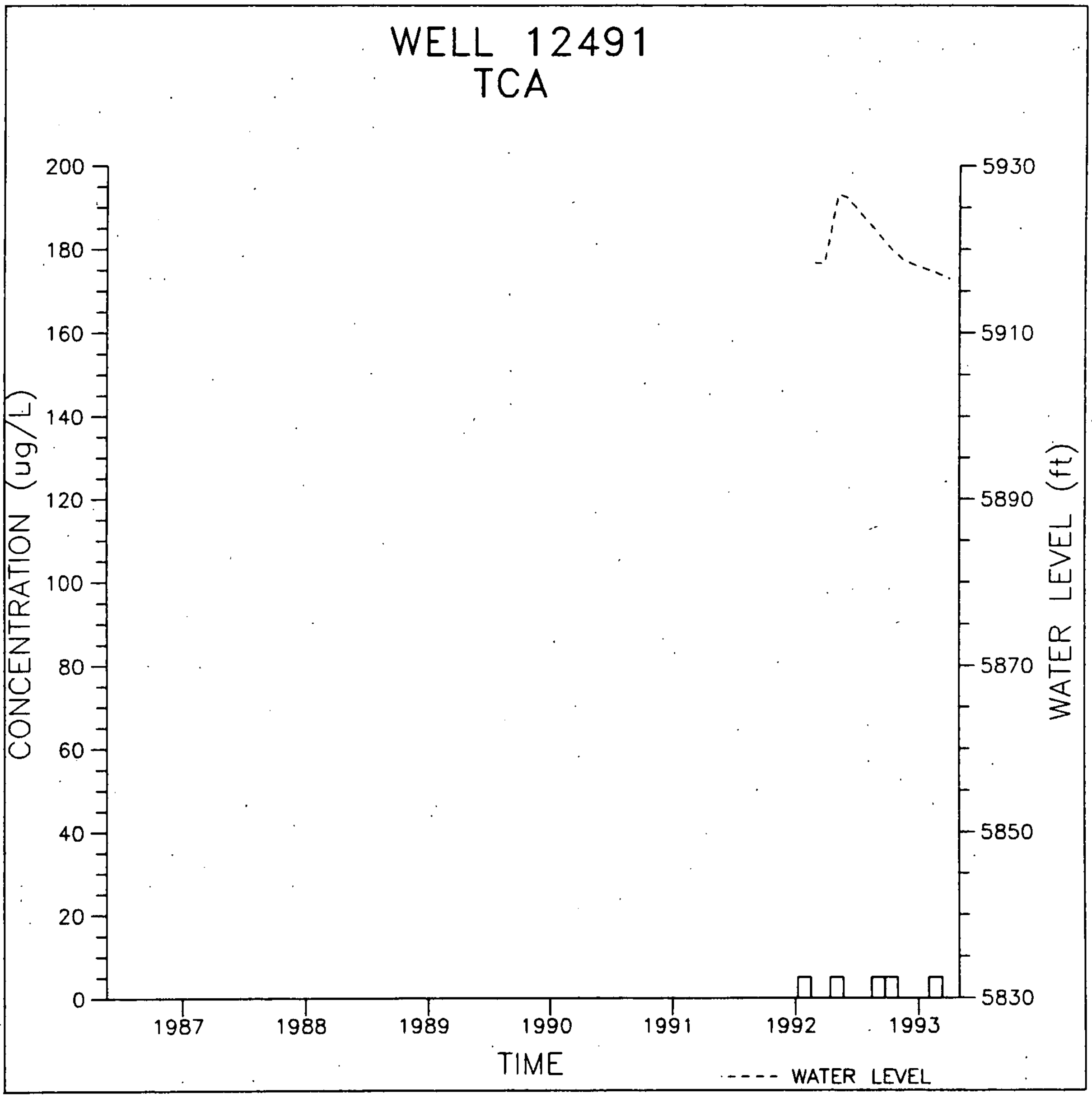
624

1875


WELL 11891
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

675

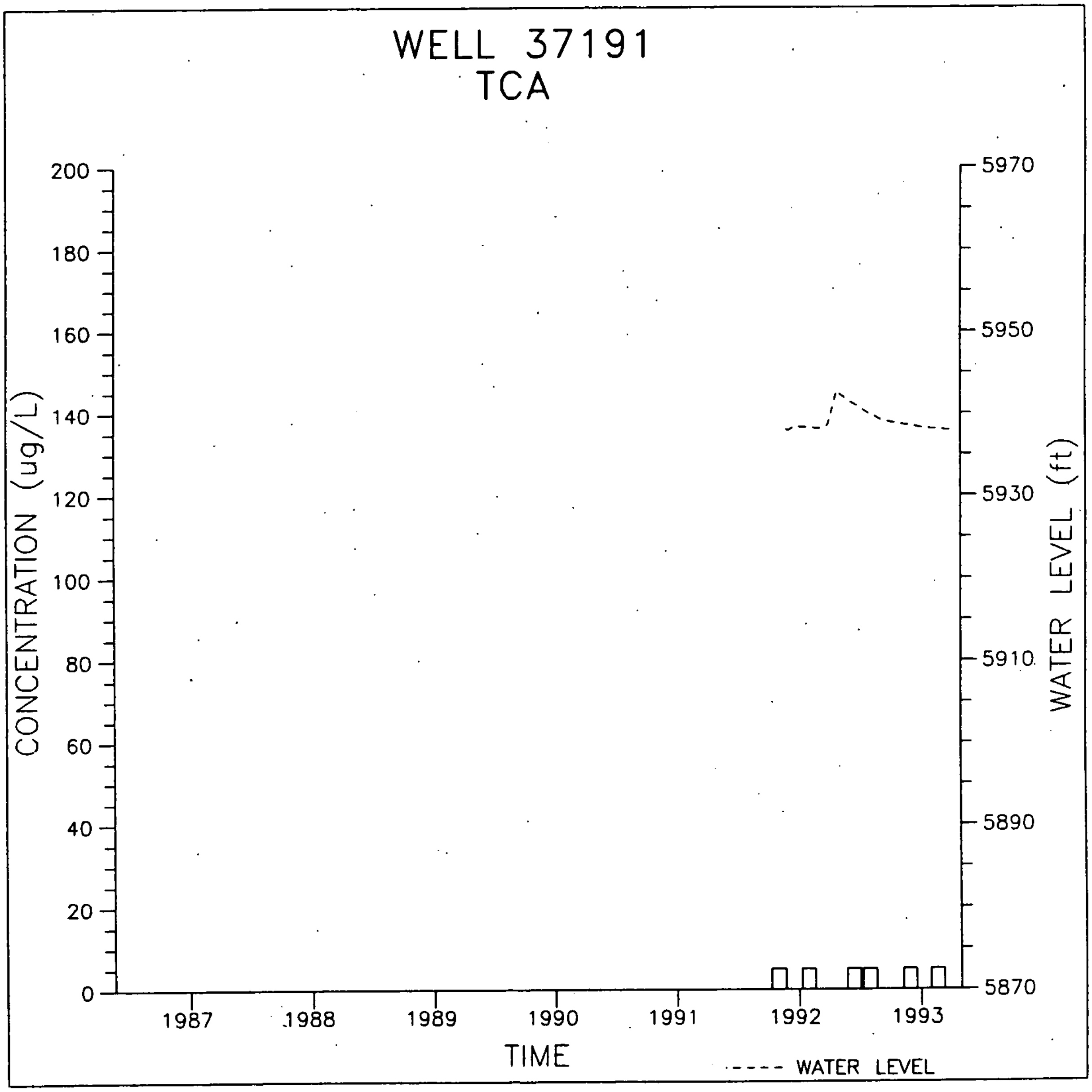
674



WELL 12491
TCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

676

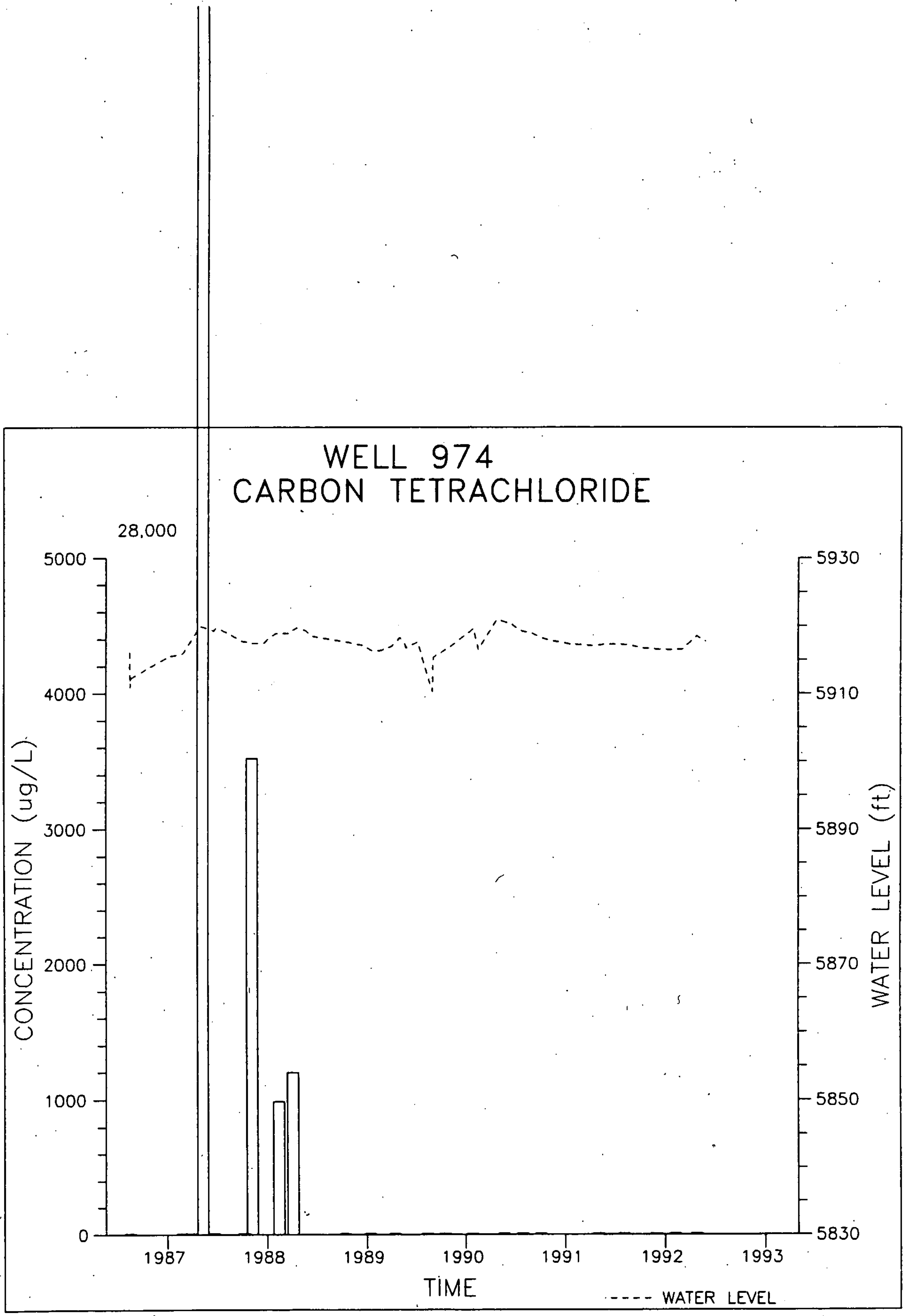
1577



WELL 37191
TCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
0
20
40
60
80
100
120
140
160
180
200
5870
5890
5910
5930
5950
5970
1987
1988
1989
1990
1991
1992
1993
WATER LEVEL

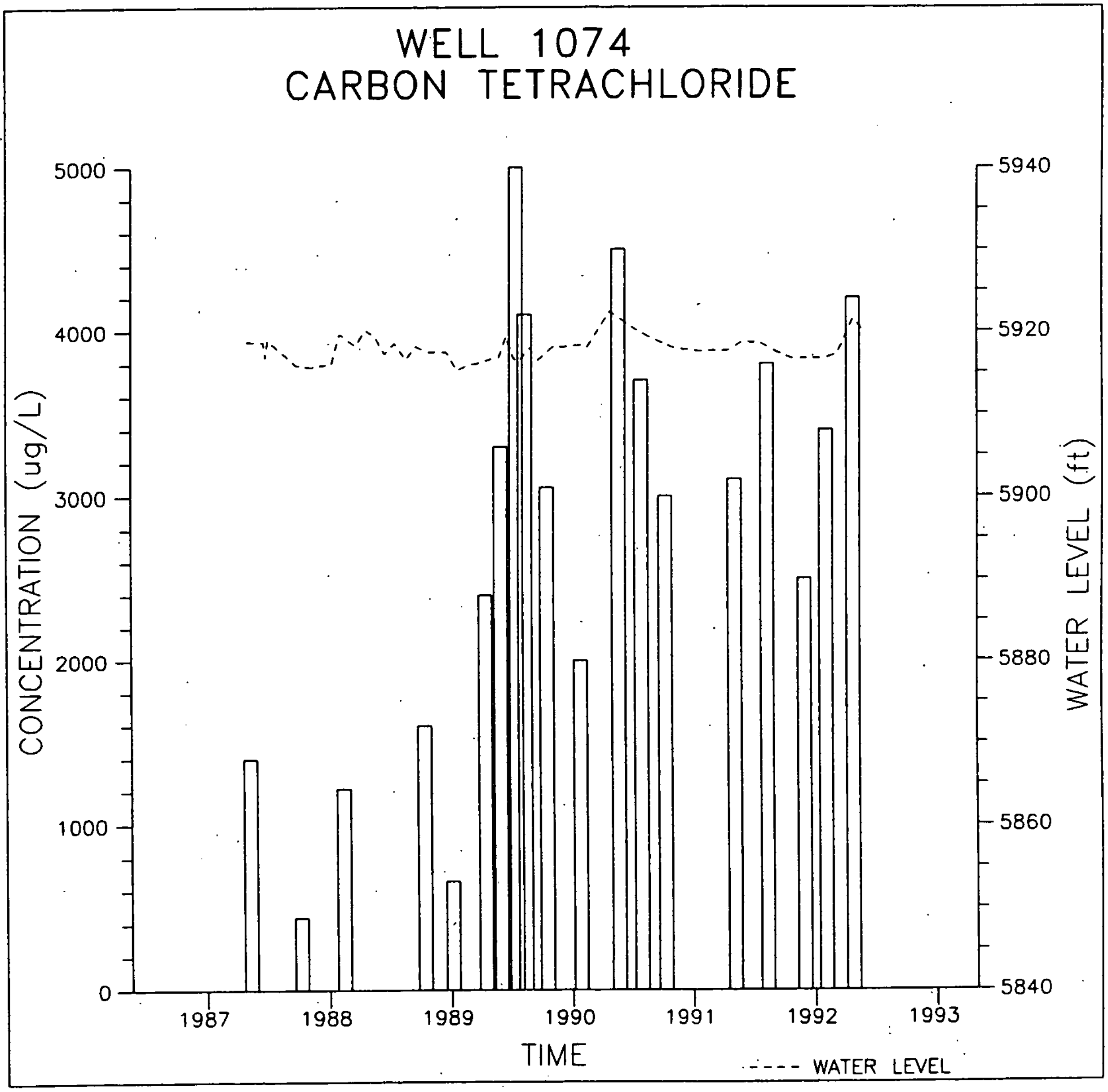
677

698


WELL 974
CARBON TETRACHLORIDE
28,000
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

678

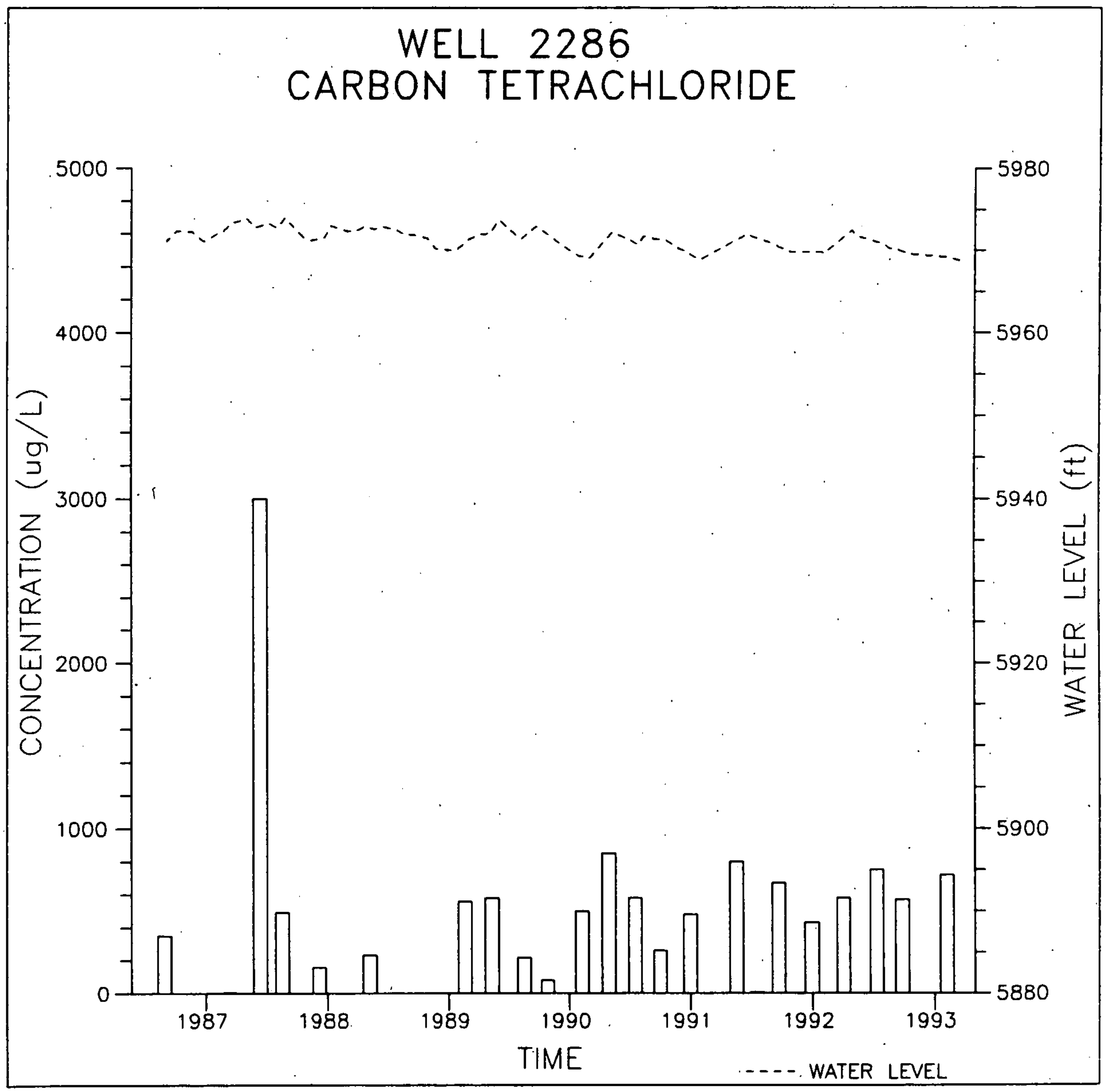
689



WELL 1074
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
0
1000
2000
3000
4000
5000
WATER LEVEL (ft)
5840
5860
5880
5900
5920
5940
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

679

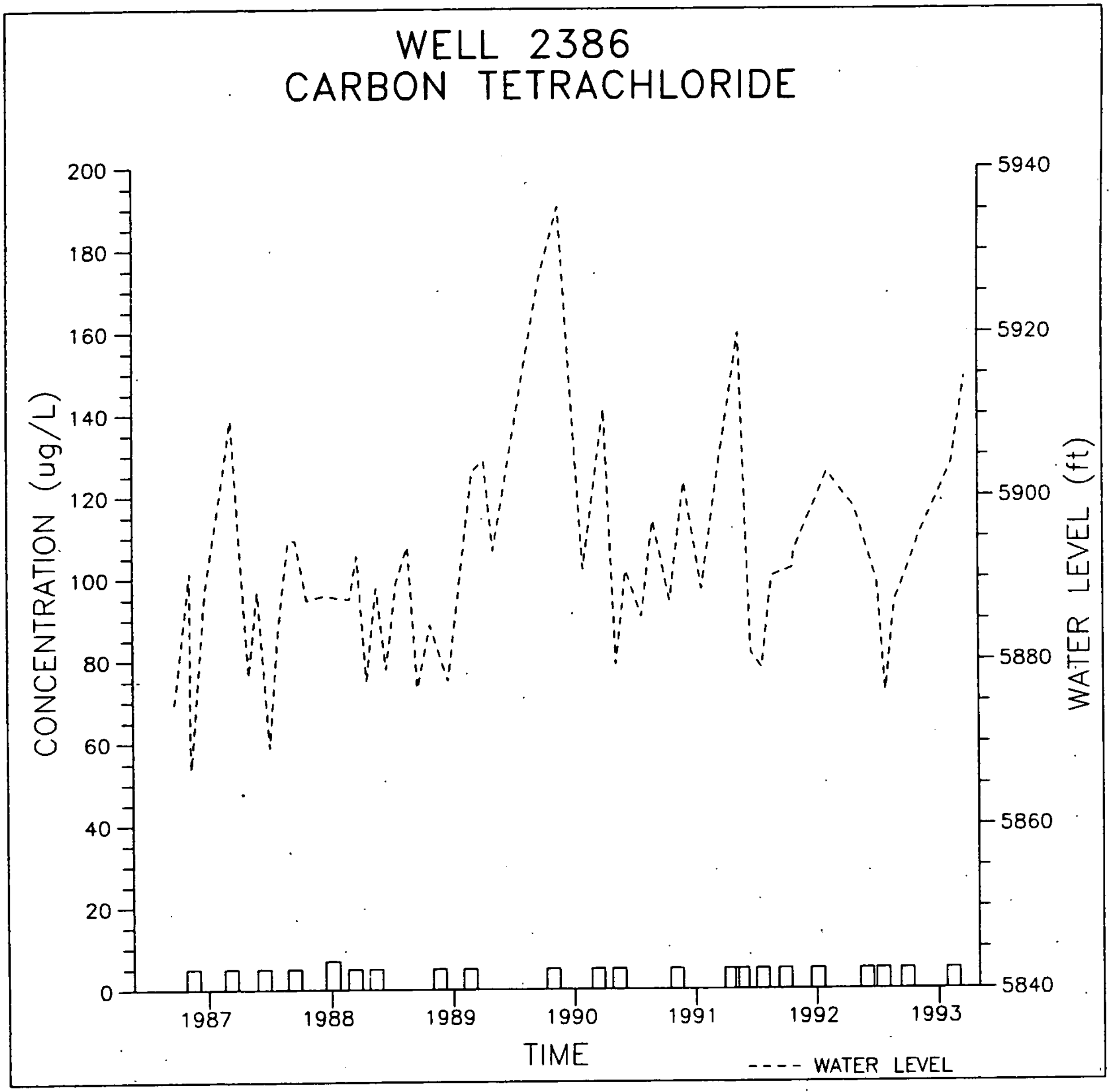
680



WELL 2286
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

680

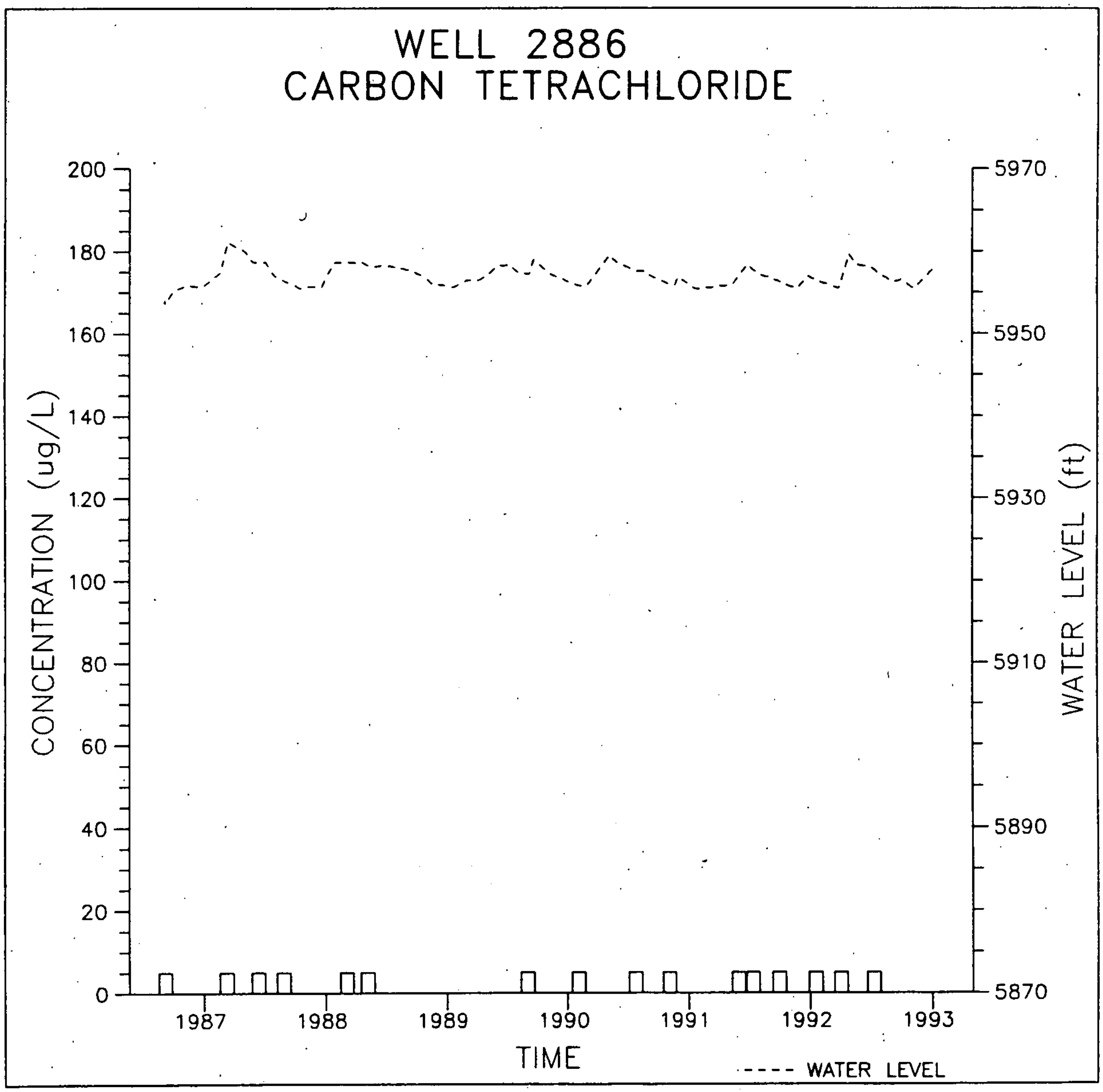
681



WELL 2386
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

681

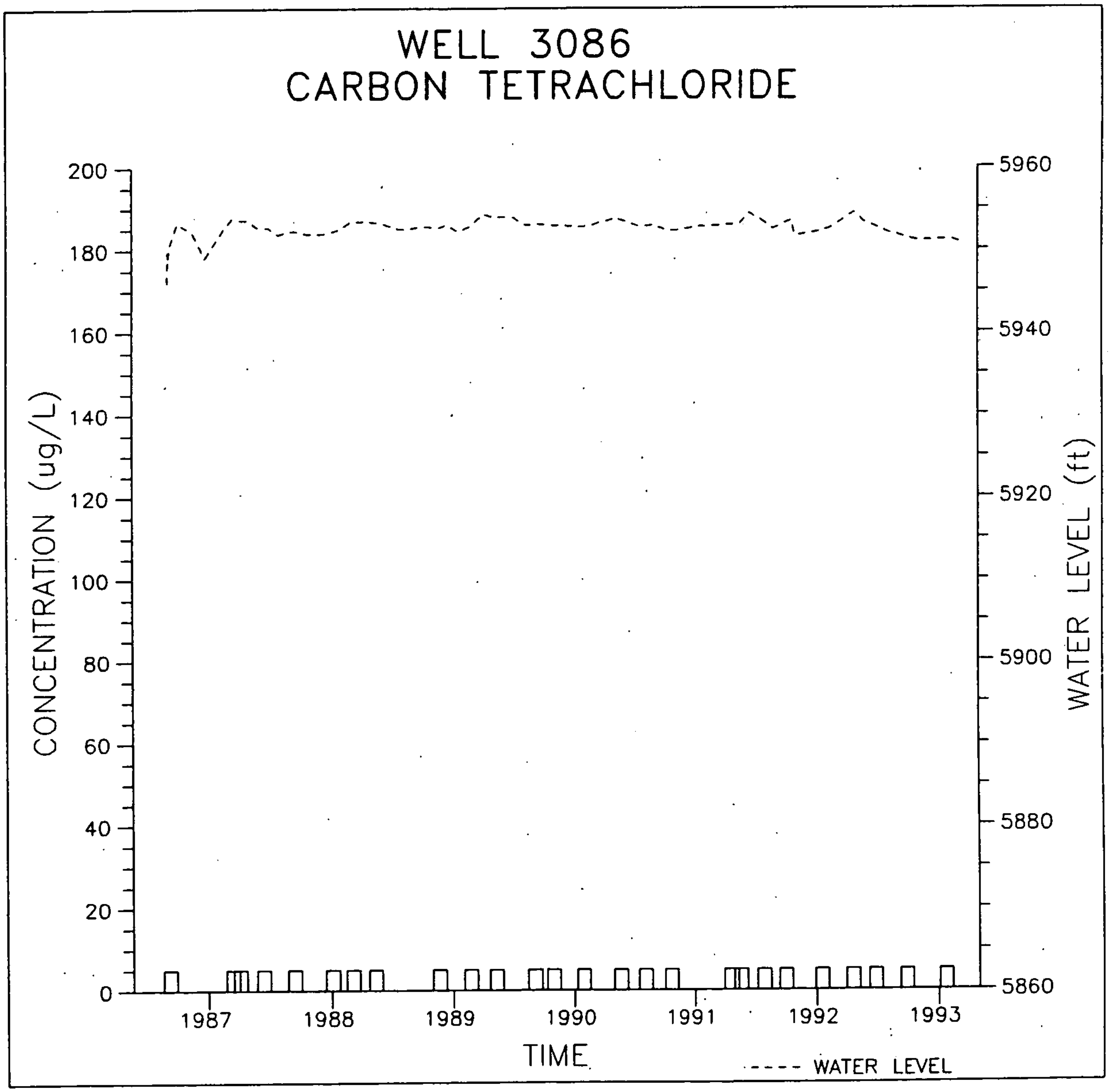
682



WELL 2886
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

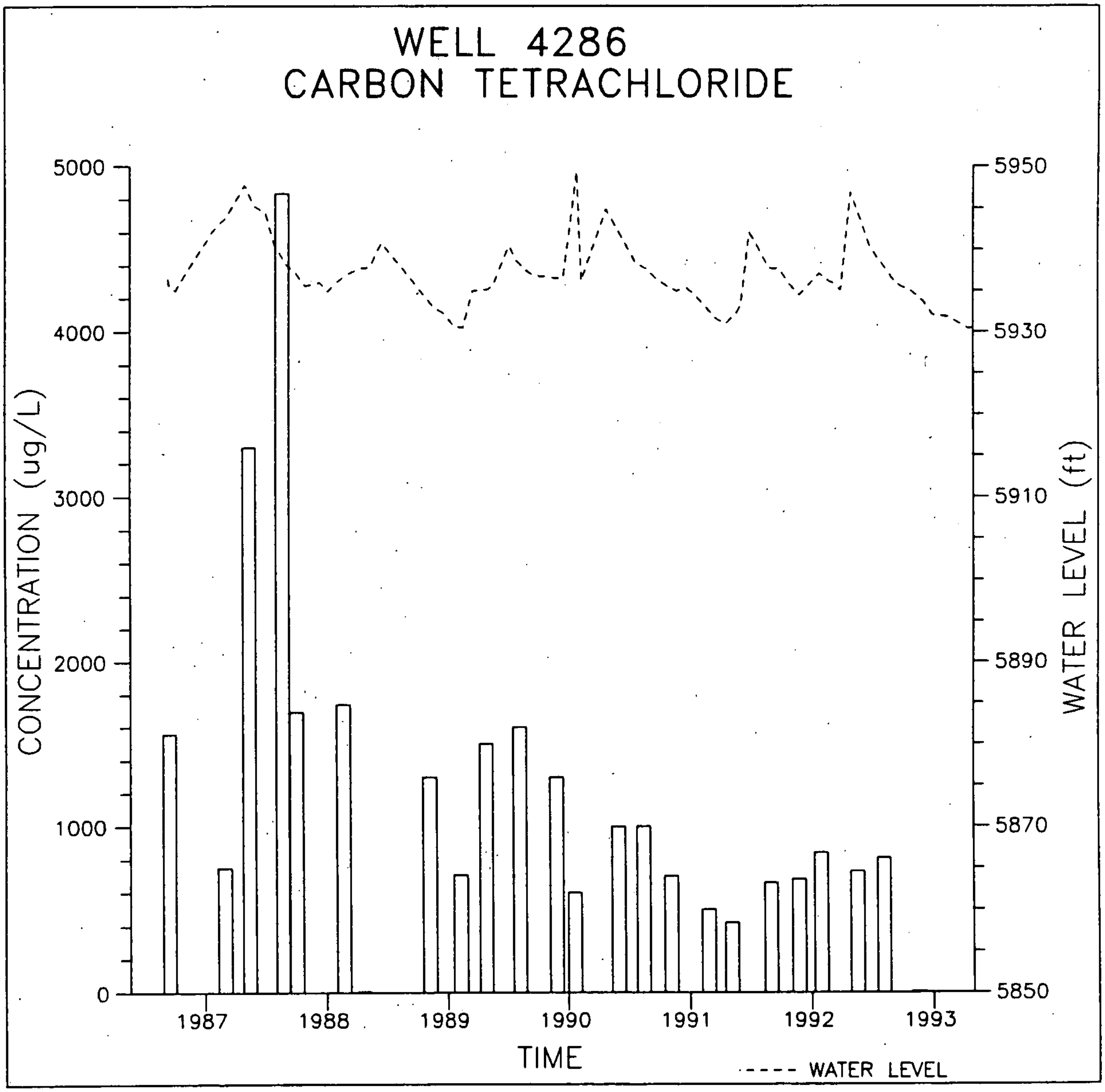
682

683


WELL 3086
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

683

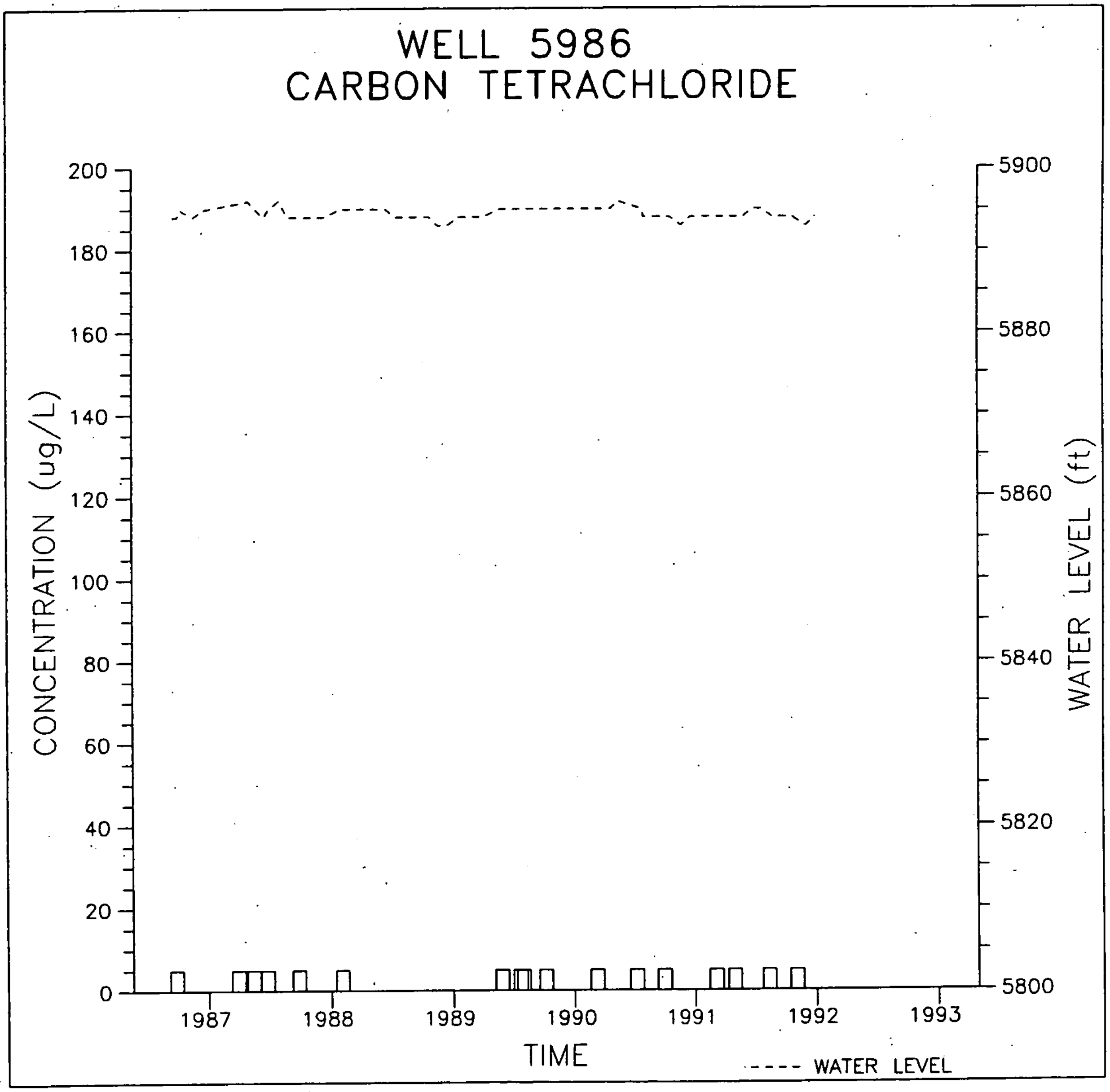
684



WELL 4286
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

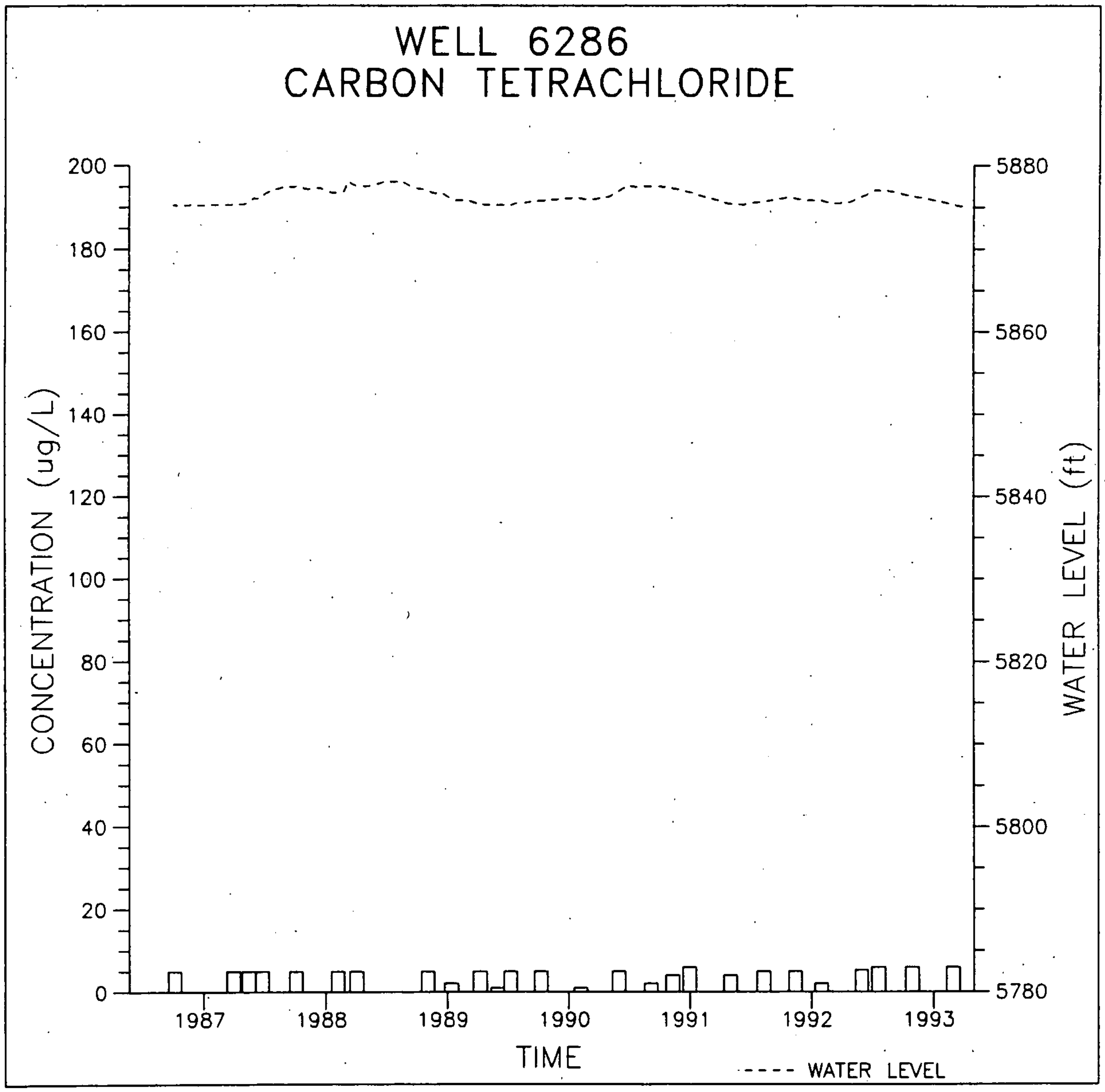
684

685



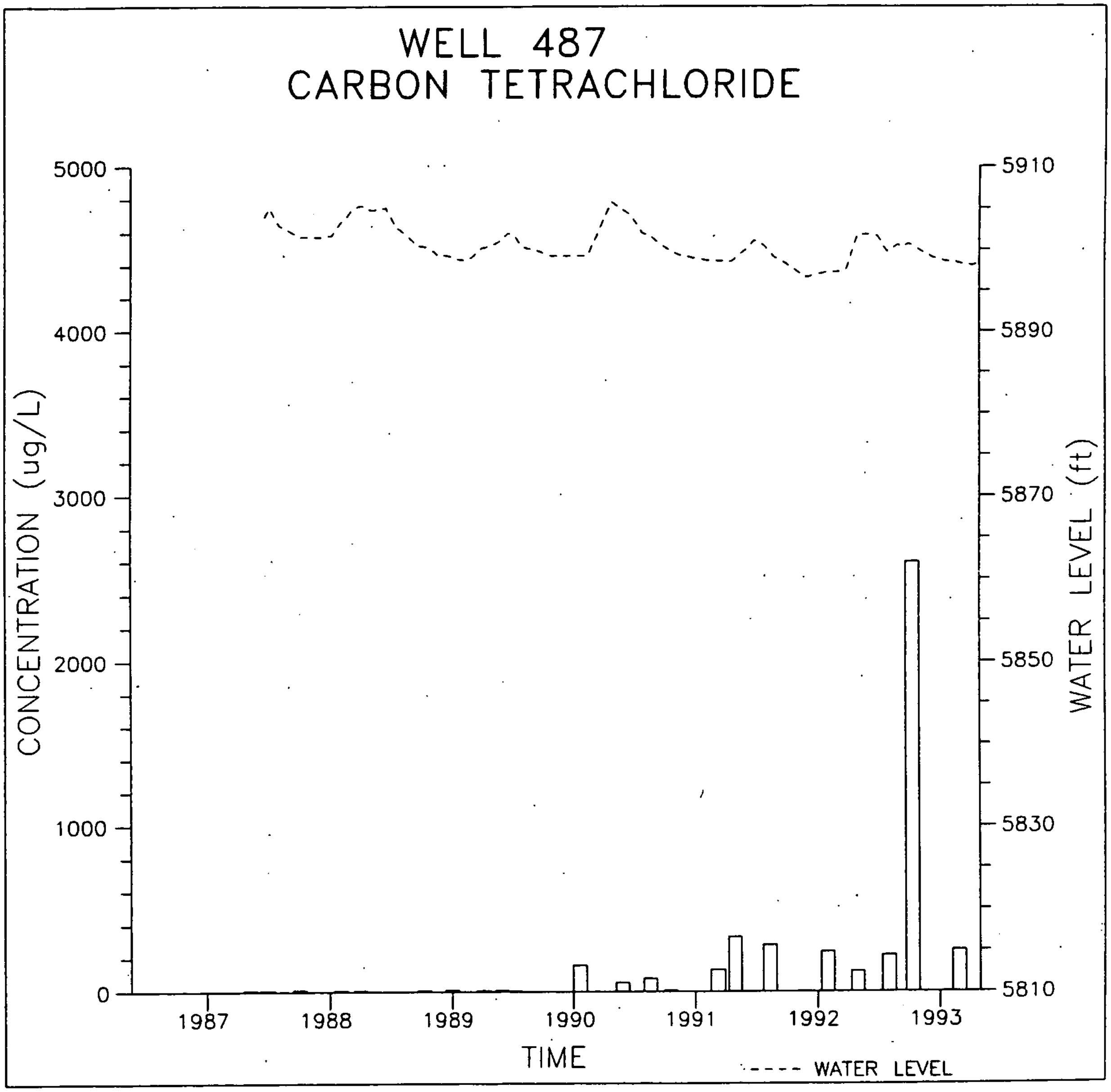
WELL 5986
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

685

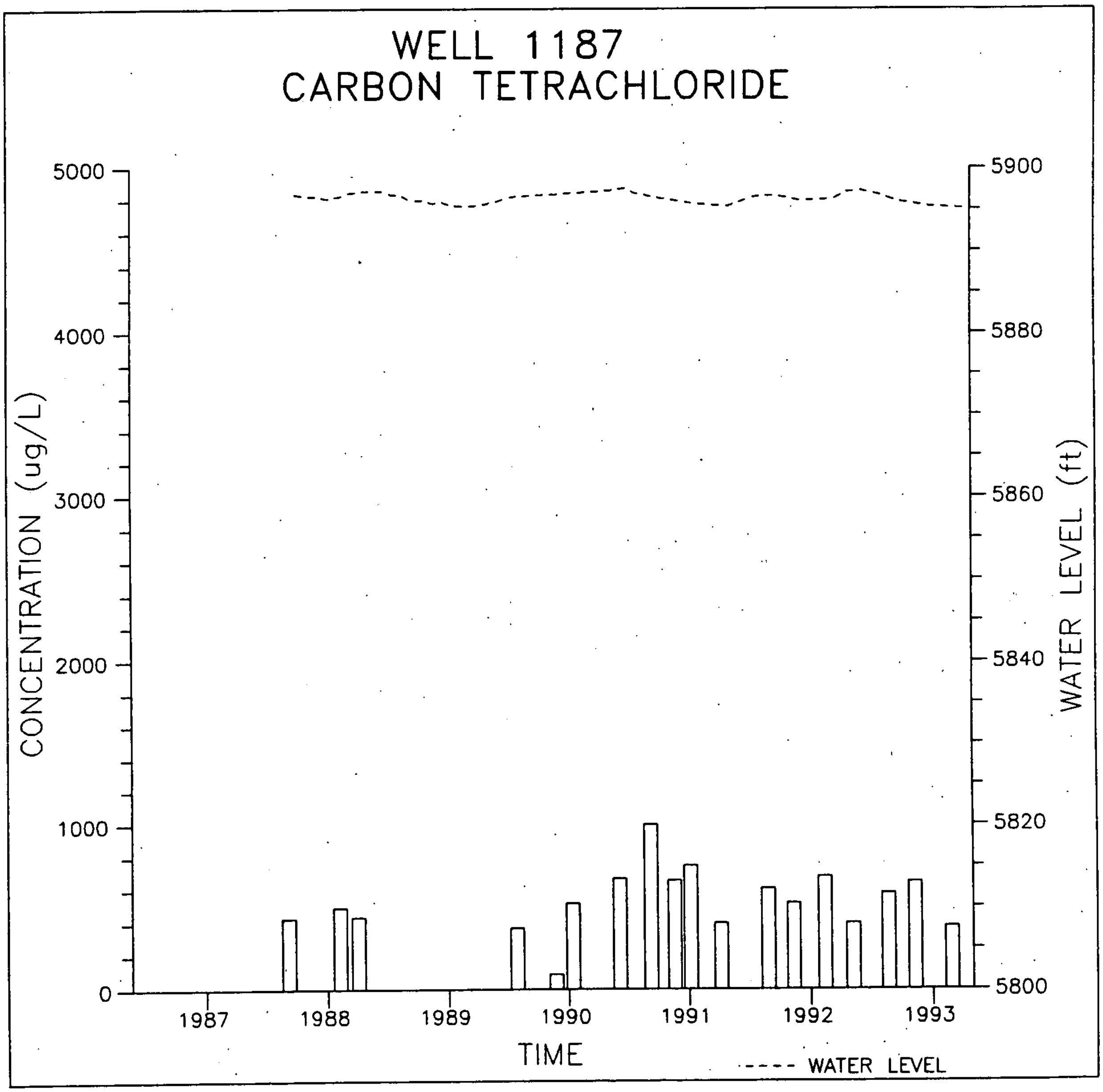

WELL 6286
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

686

689

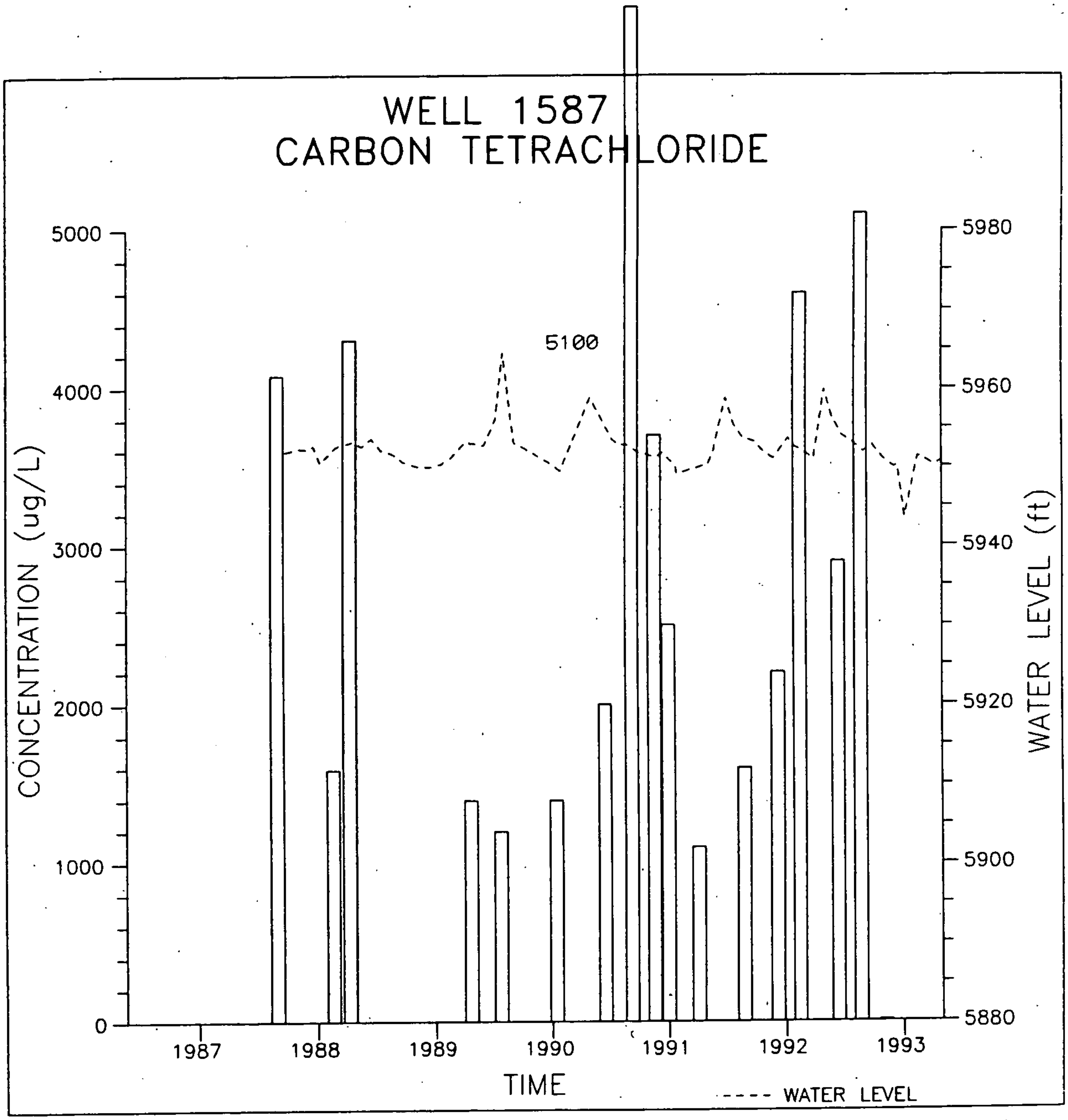


WELL 487
CARBON TETRACHLORIDE
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5910
5890
5870
5850
5830
5810
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
----- WATER LEVEL


WELL 1187
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

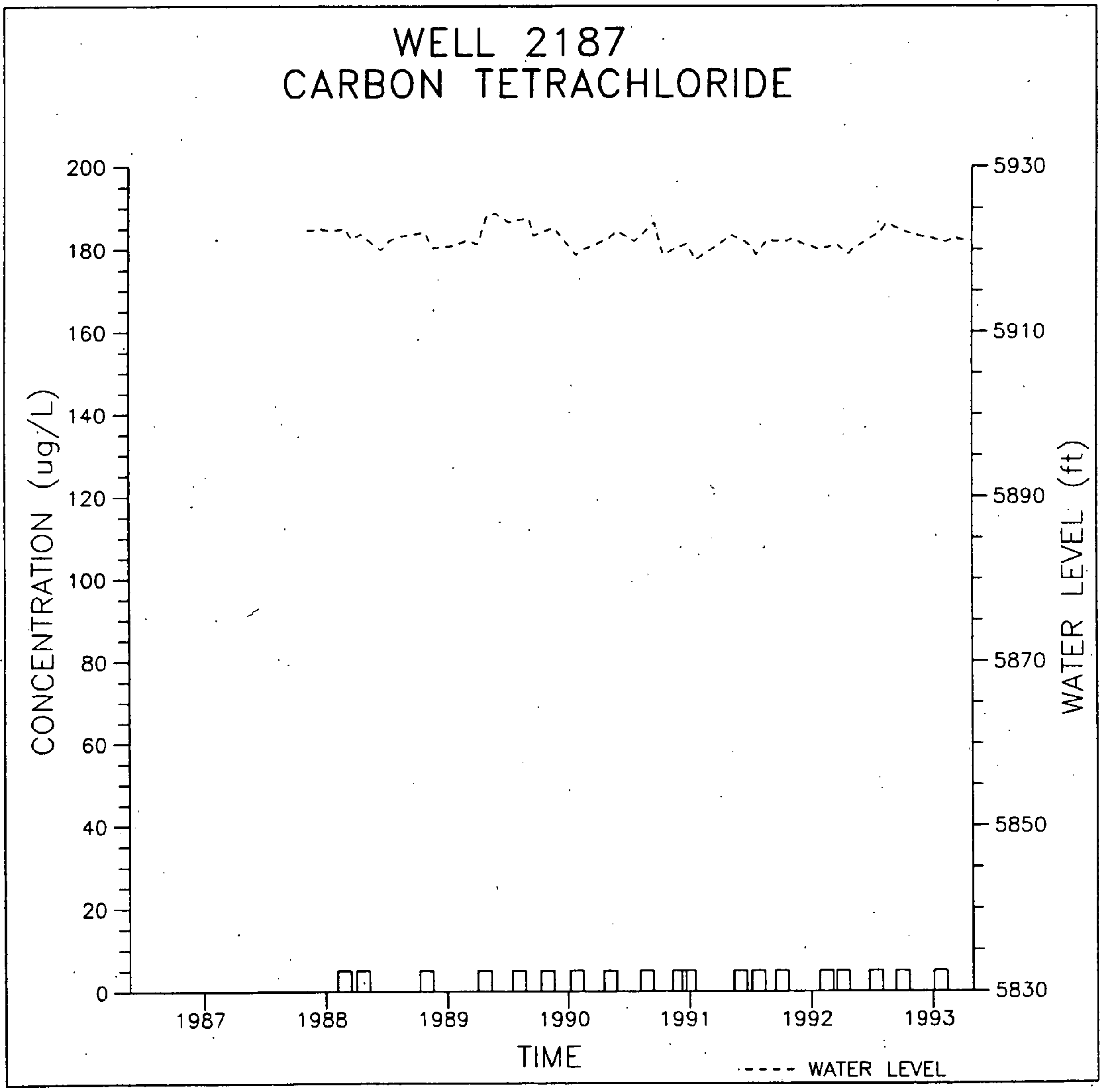
688

689



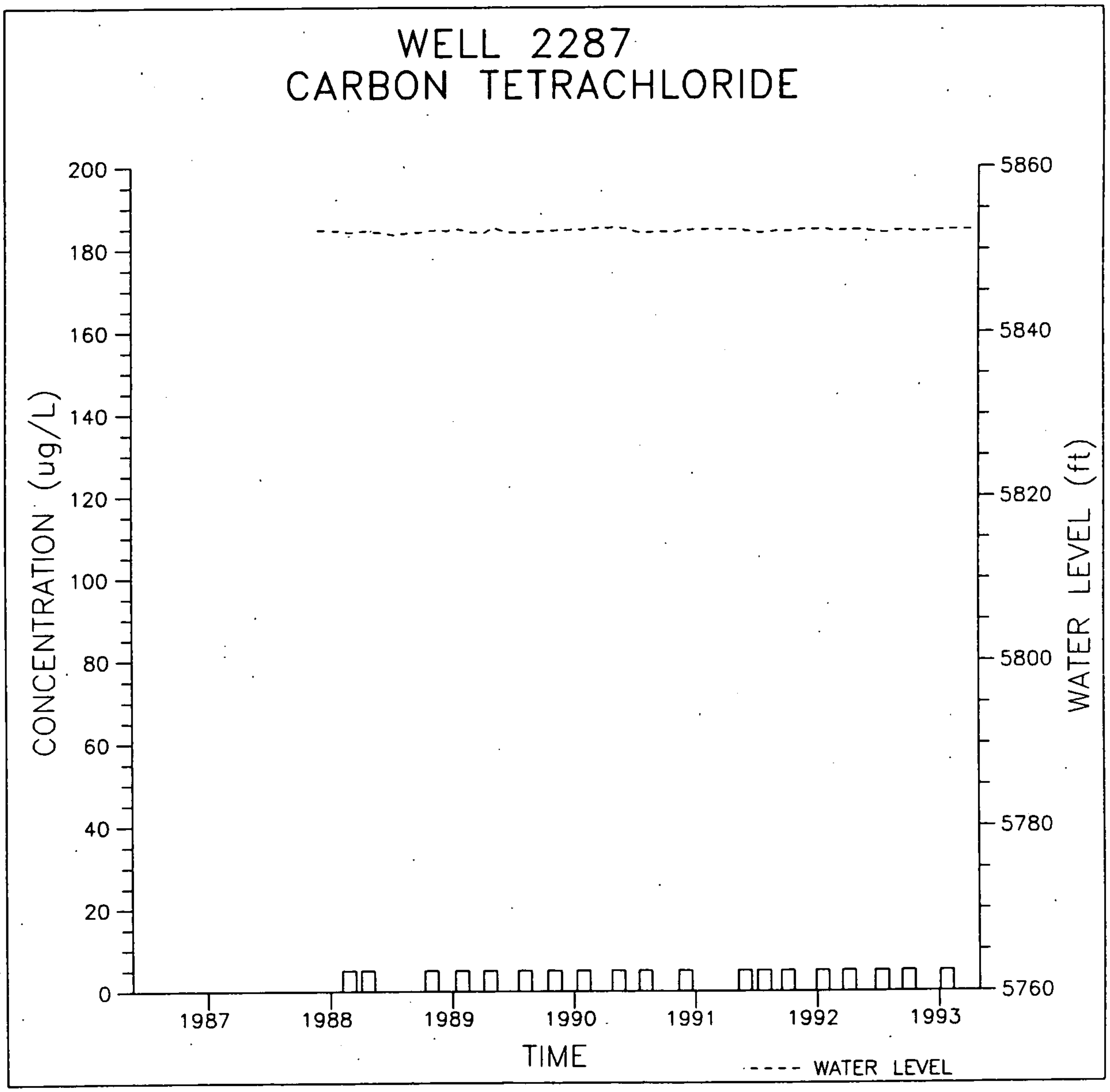
WELL 1587
CARBON TETRACHLORIDE
5100
CONCENTRATION (ug/L)
0
1000
2000
3000
4000
5000
WATER LEVEL (ft)
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

689



WELL 2187
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5830
5850
5870
5890
5910
5930
1987
1988
1989
1990
1991
1992
1993

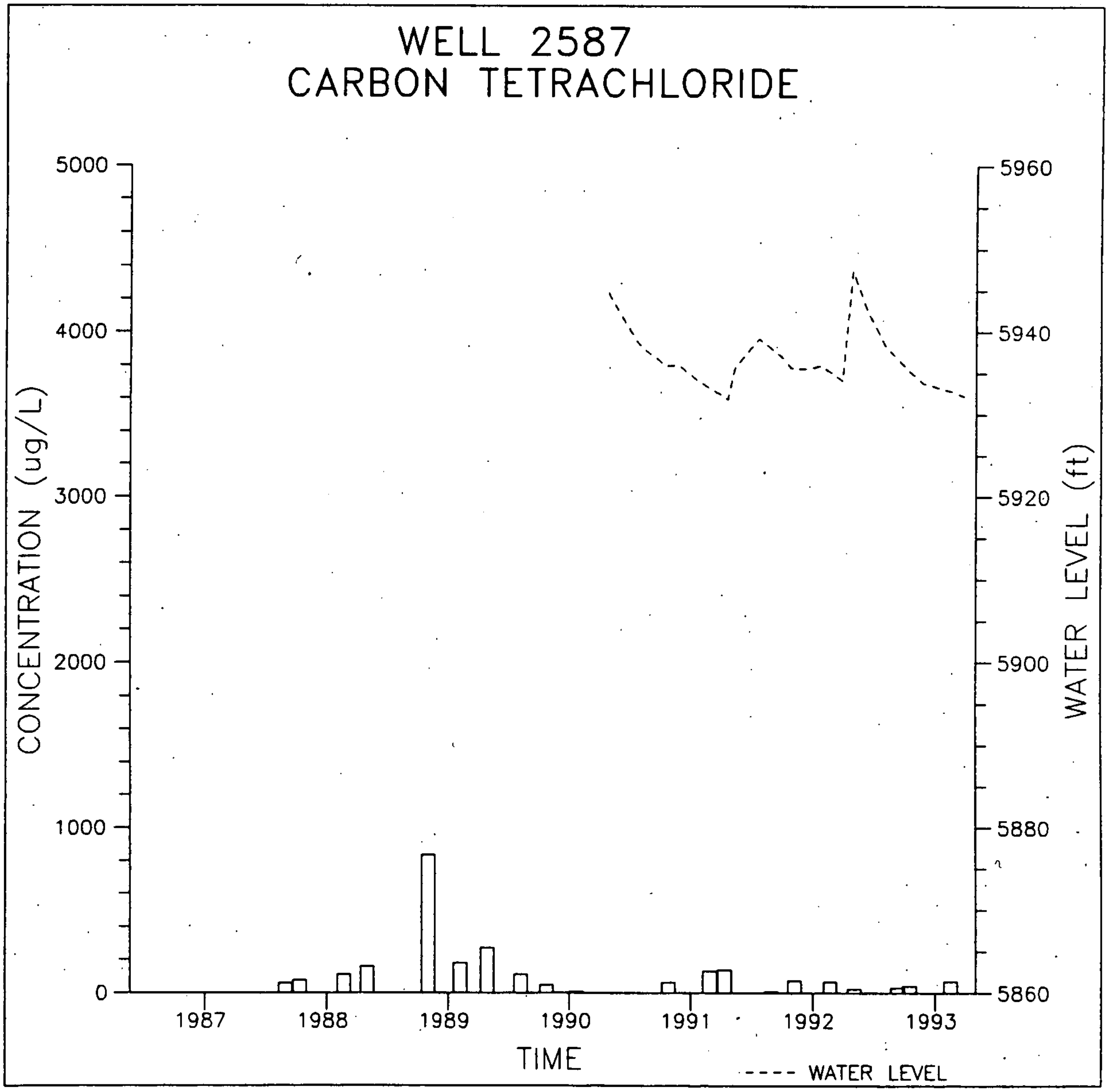
690



WELL 2287
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

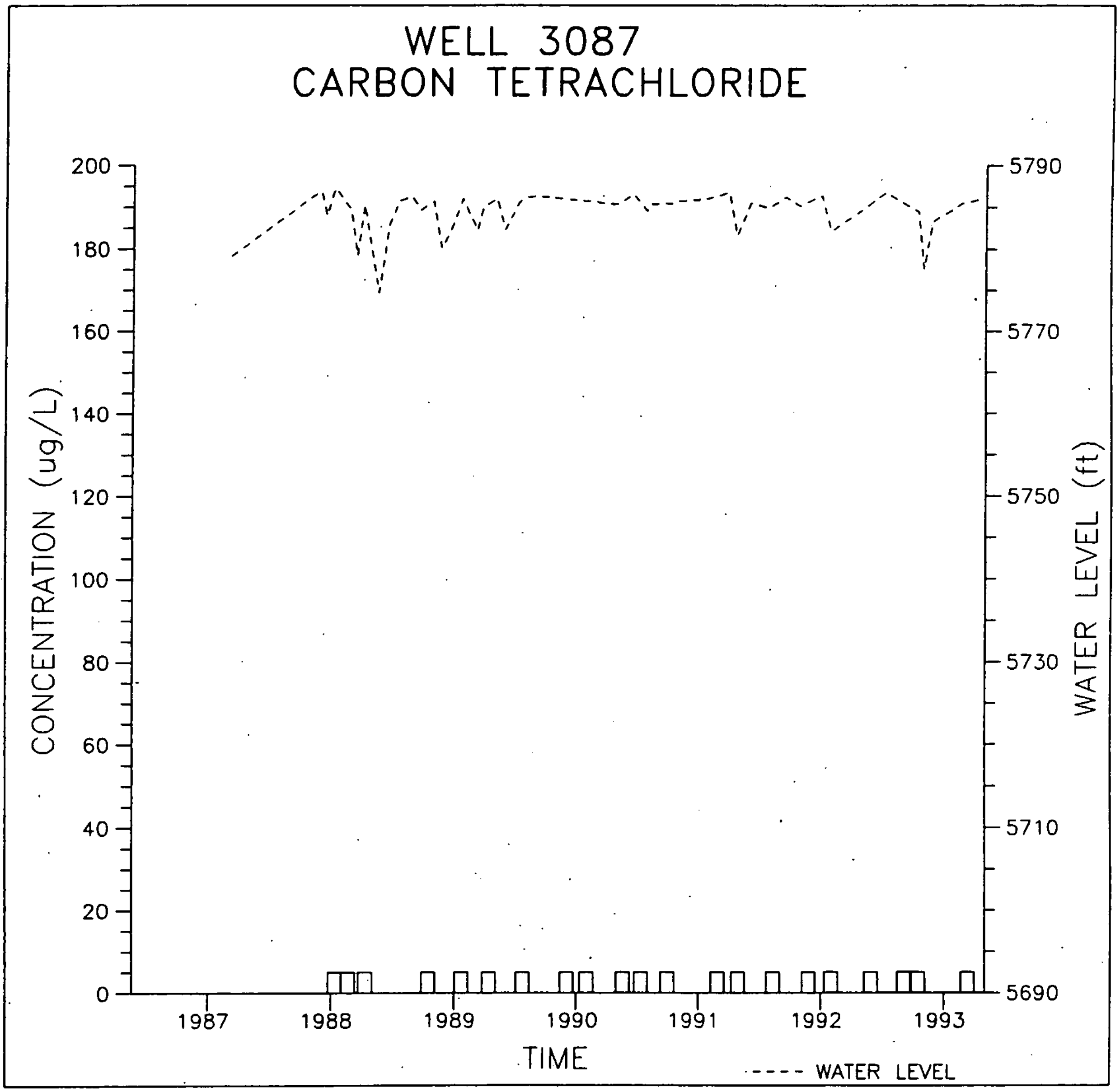
691

690



WELL 2587
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

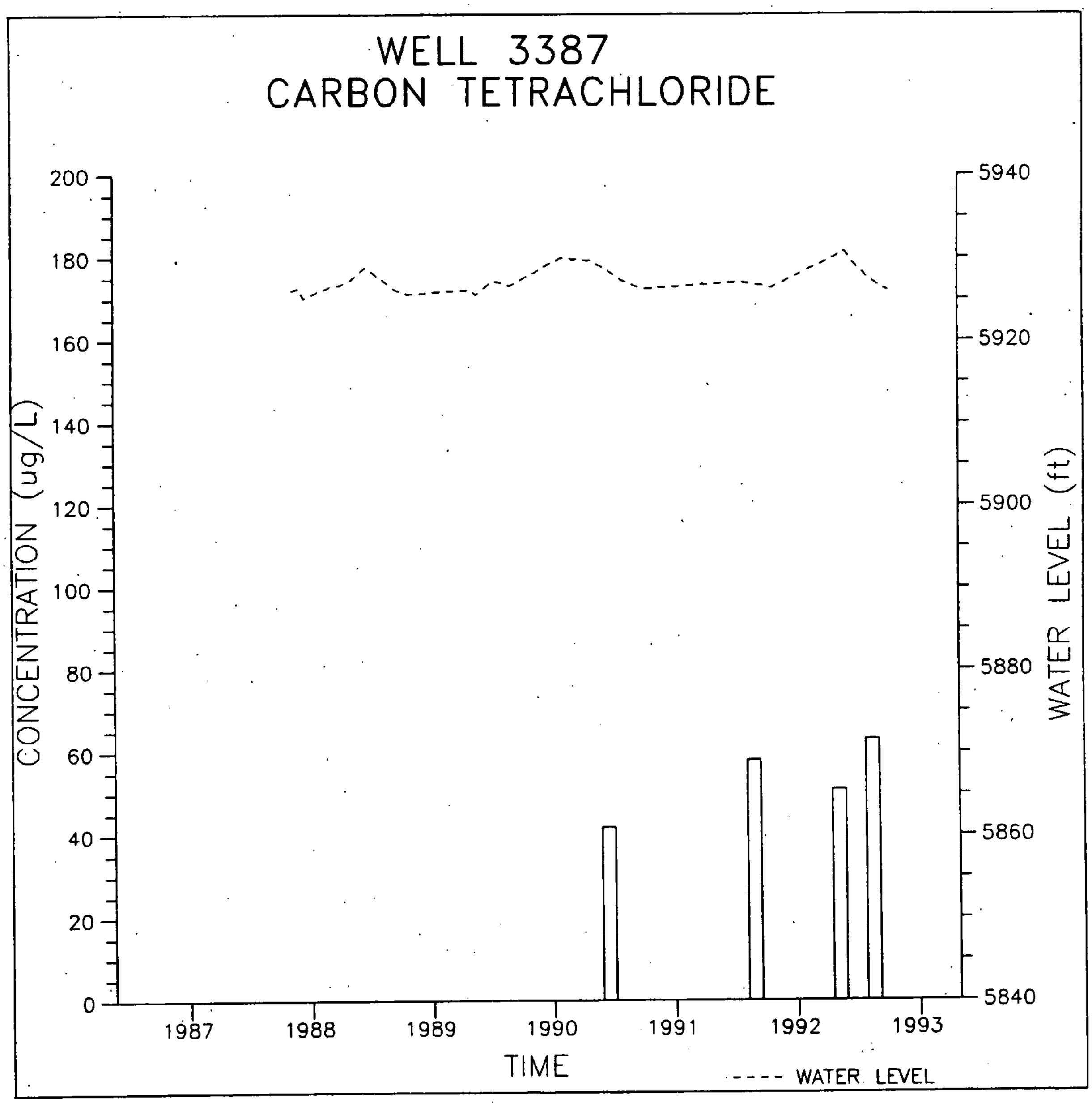
692



WELL 3087
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5790
5770
5750
5730
5710
5690
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

693

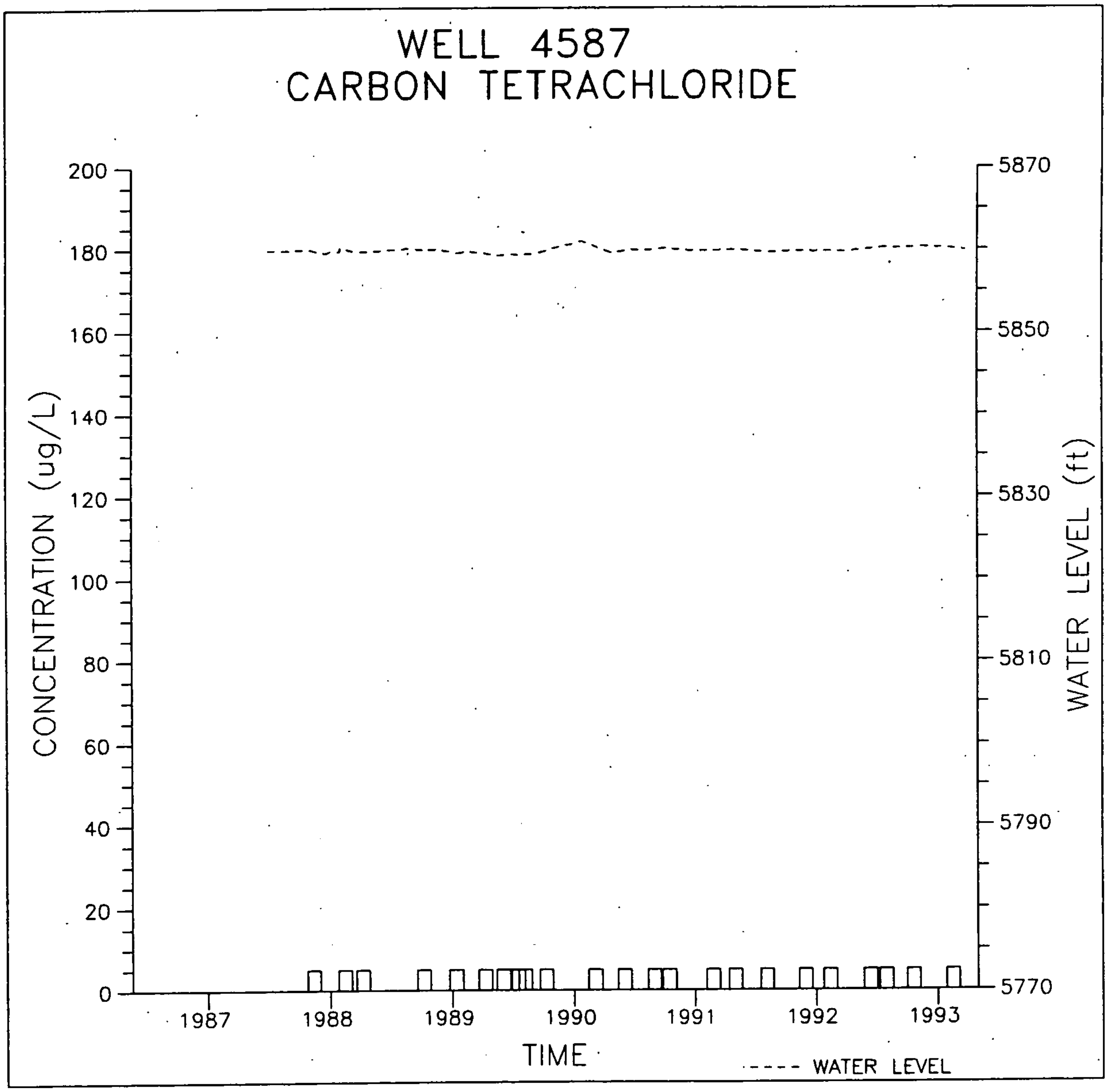
685



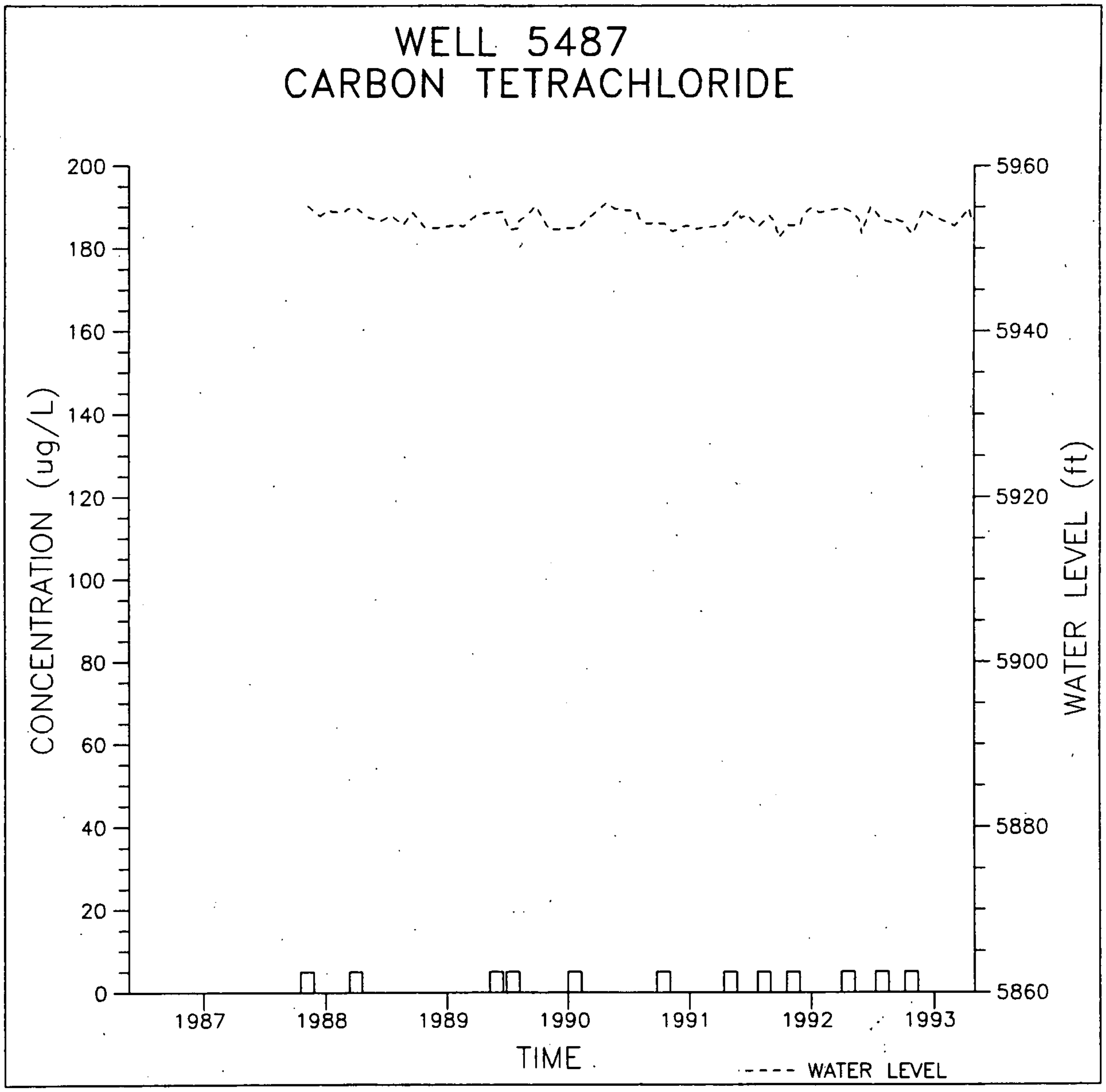
WELL 3387
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

694

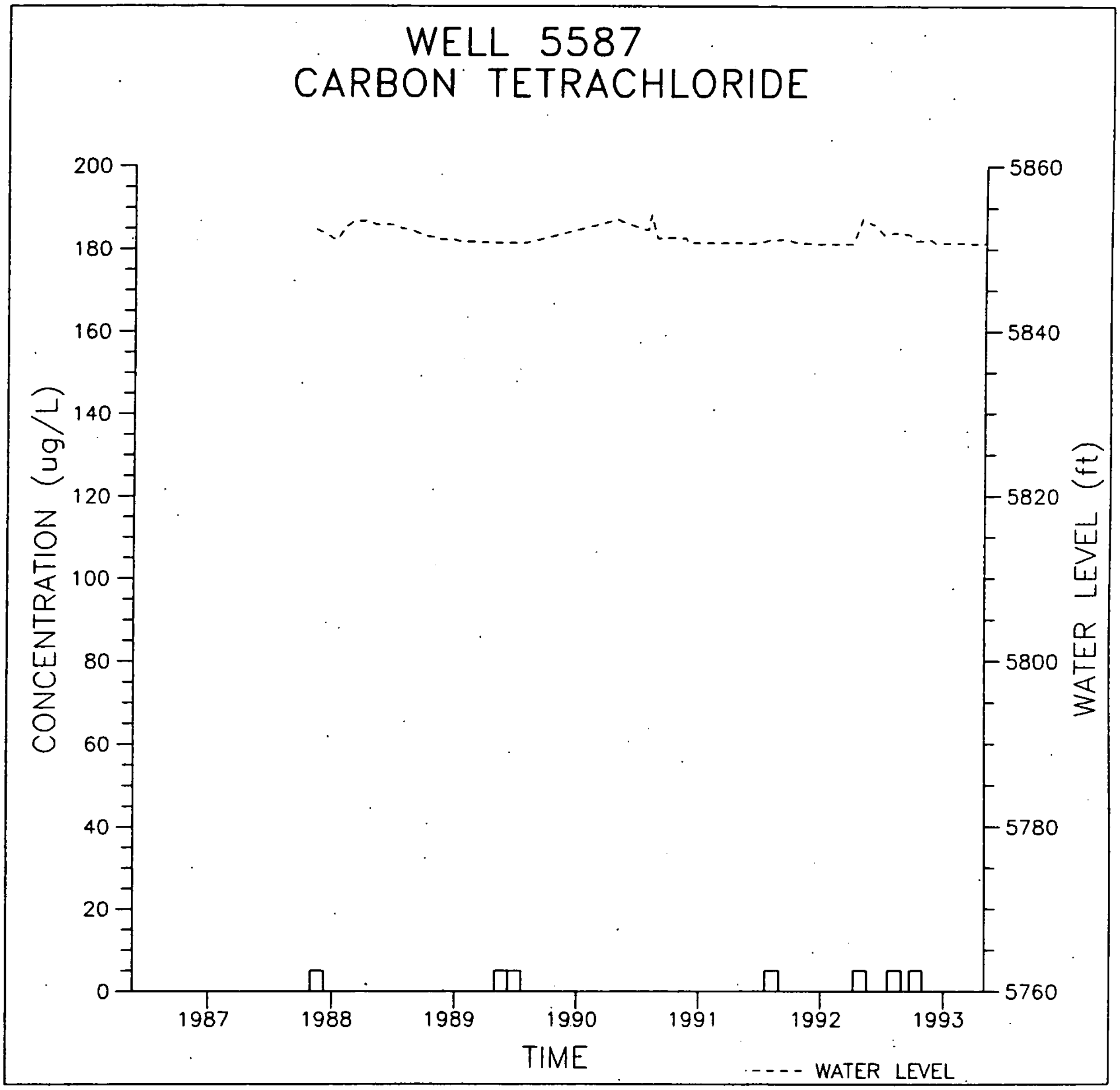
895


WELL 4587
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

695

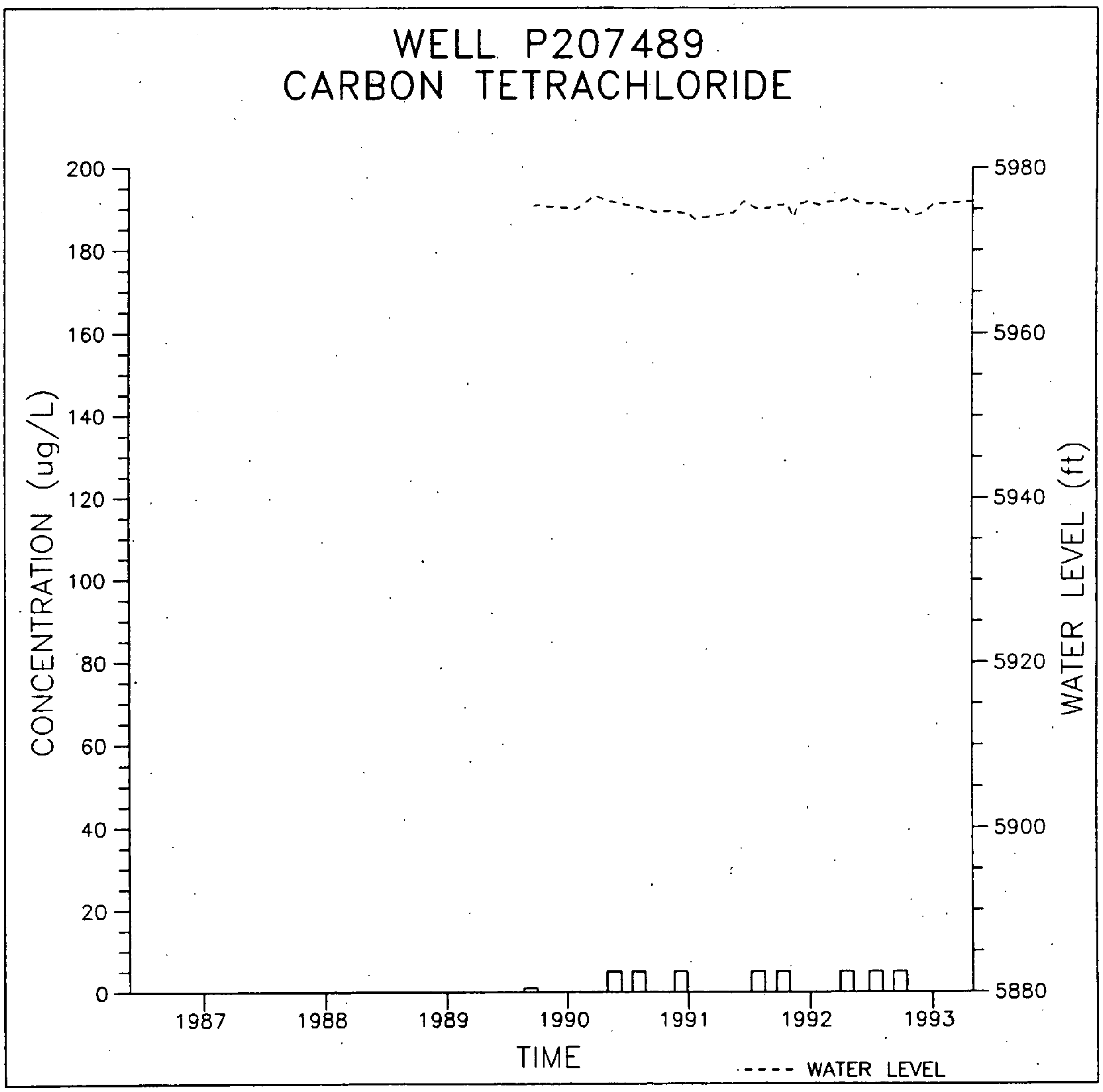

WELL 5487
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

696


WELL 5587
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

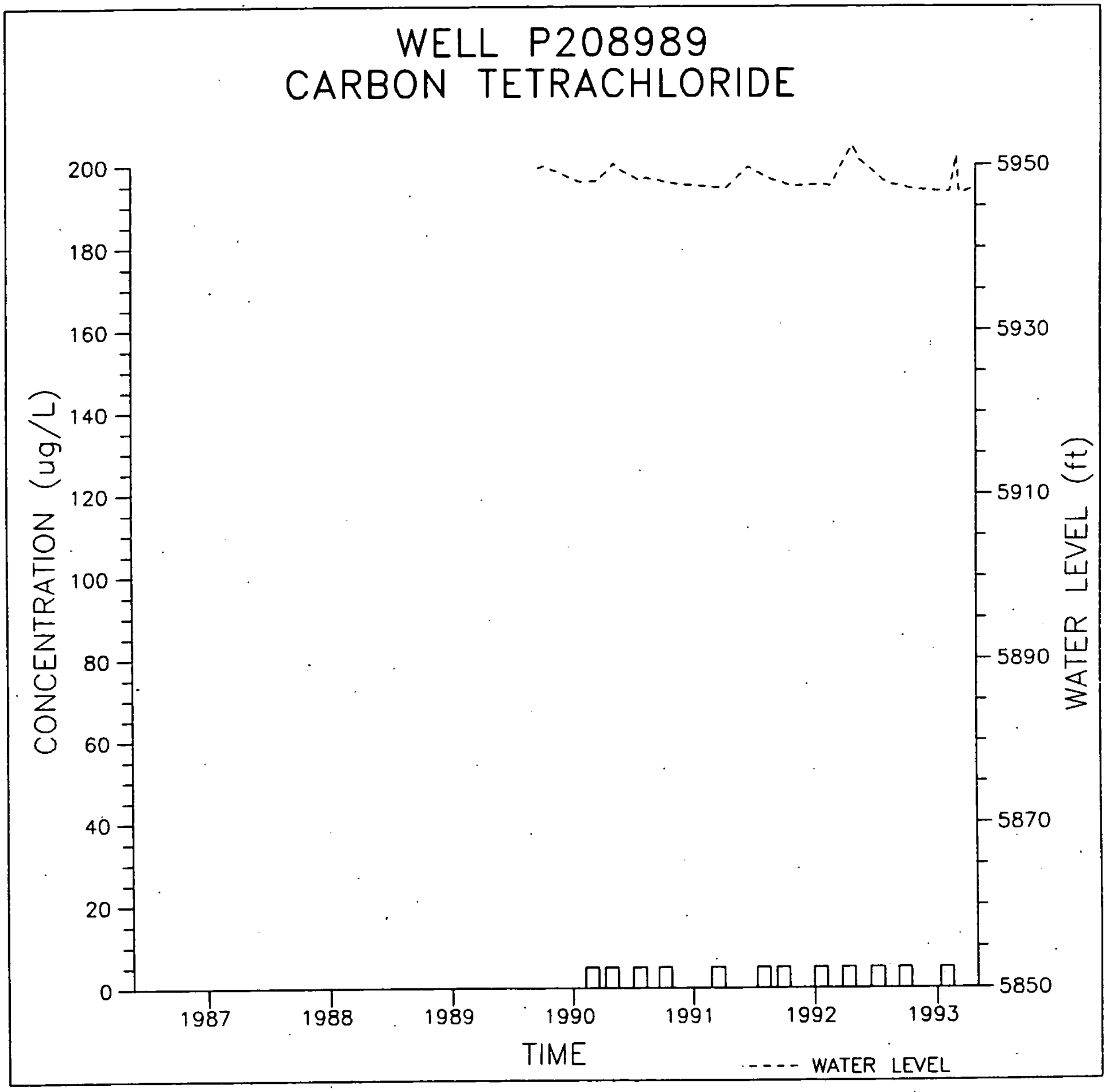
697

698


WELL P207489
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

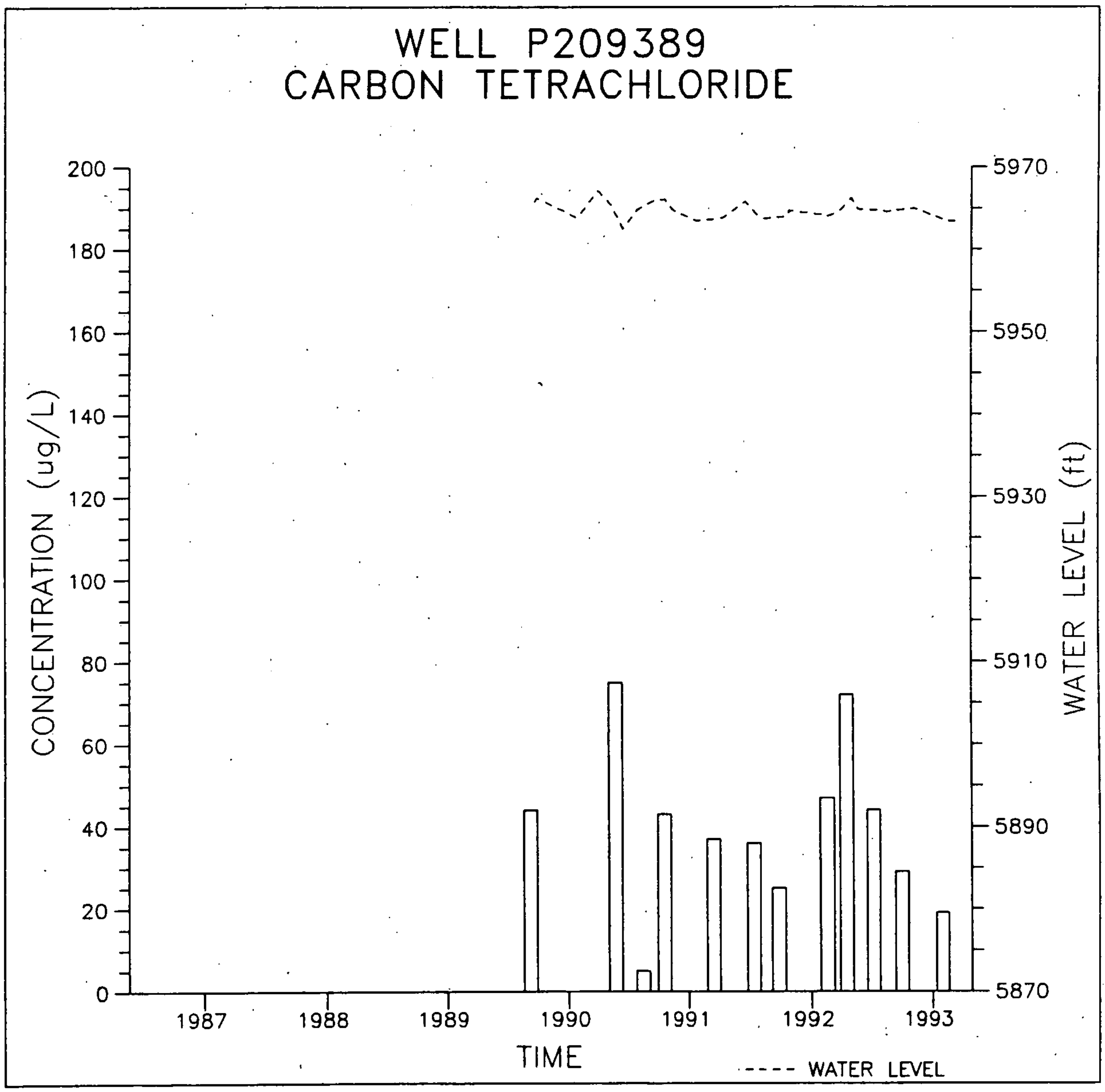
698

6899

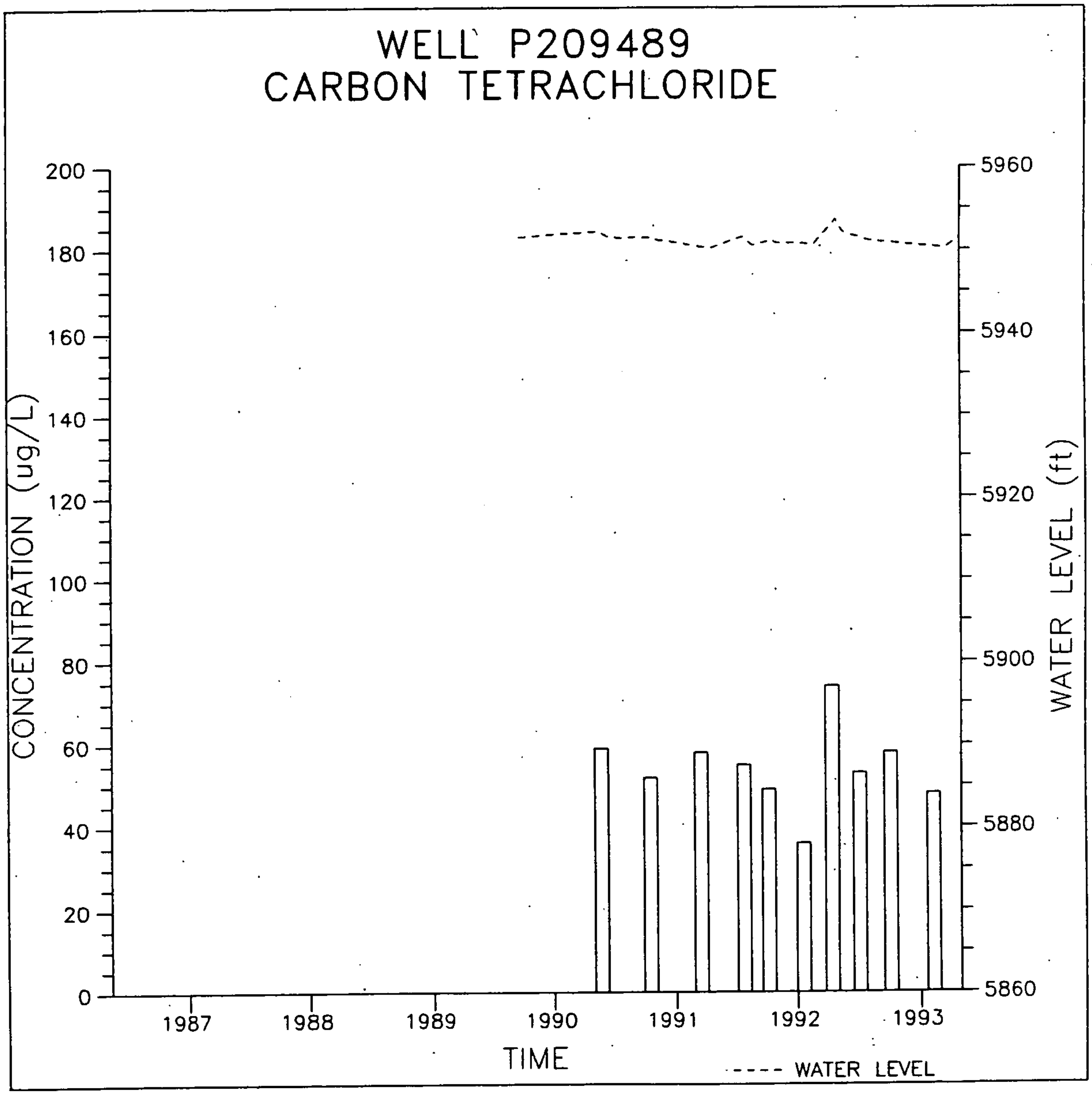


WELL P208989
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

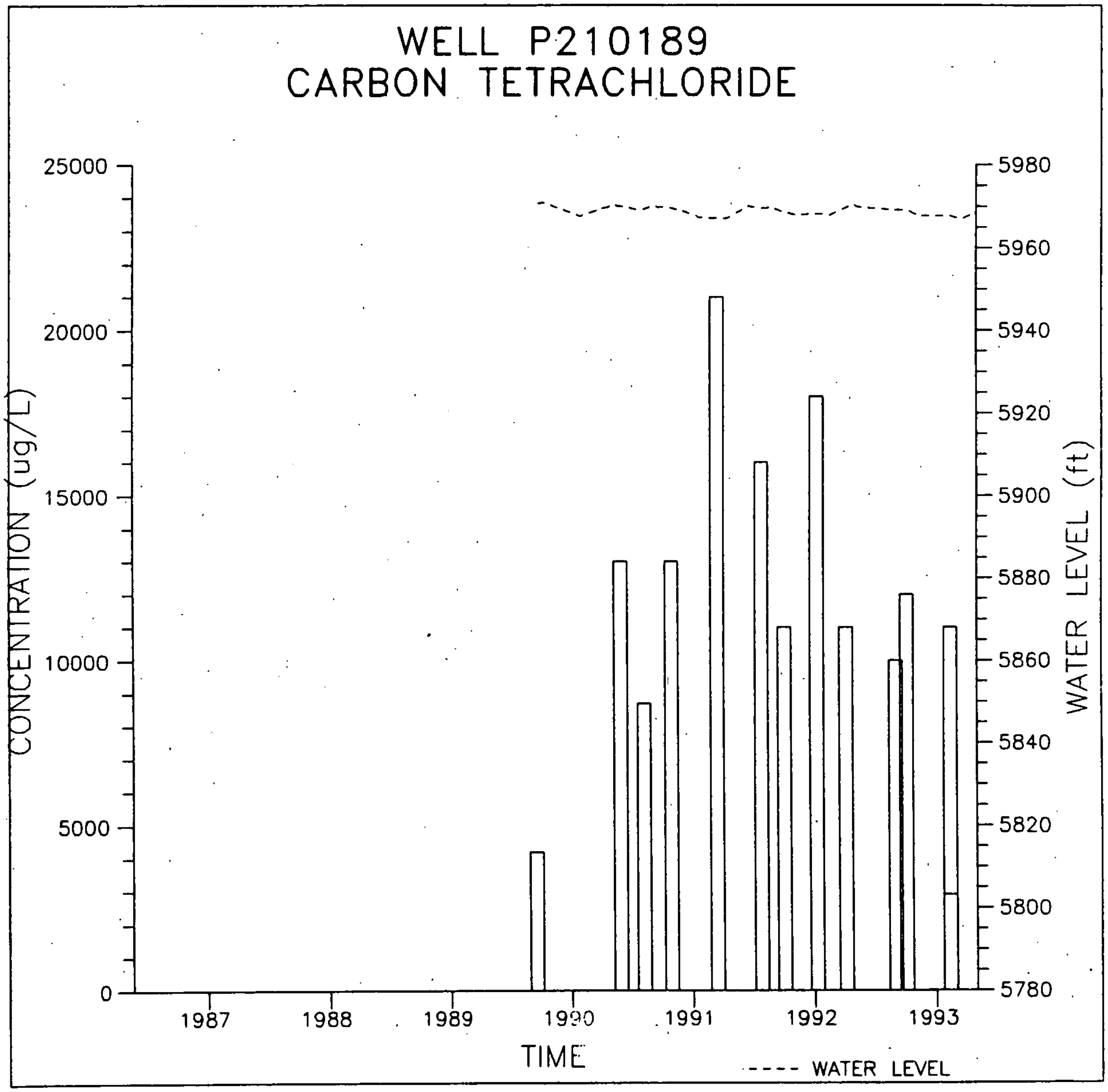
699


WELL P209389
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

700

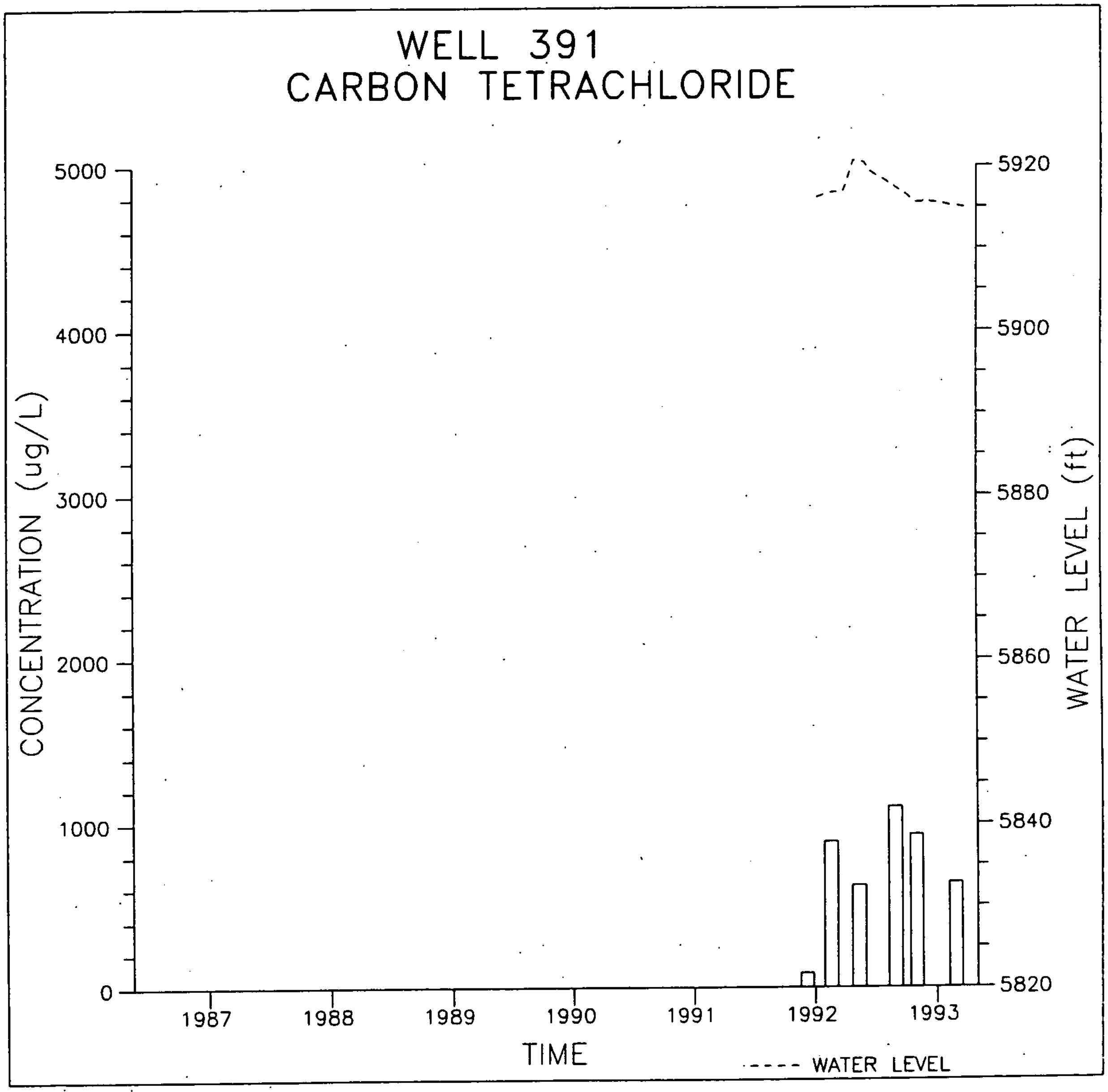

WELL P209489
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993

701

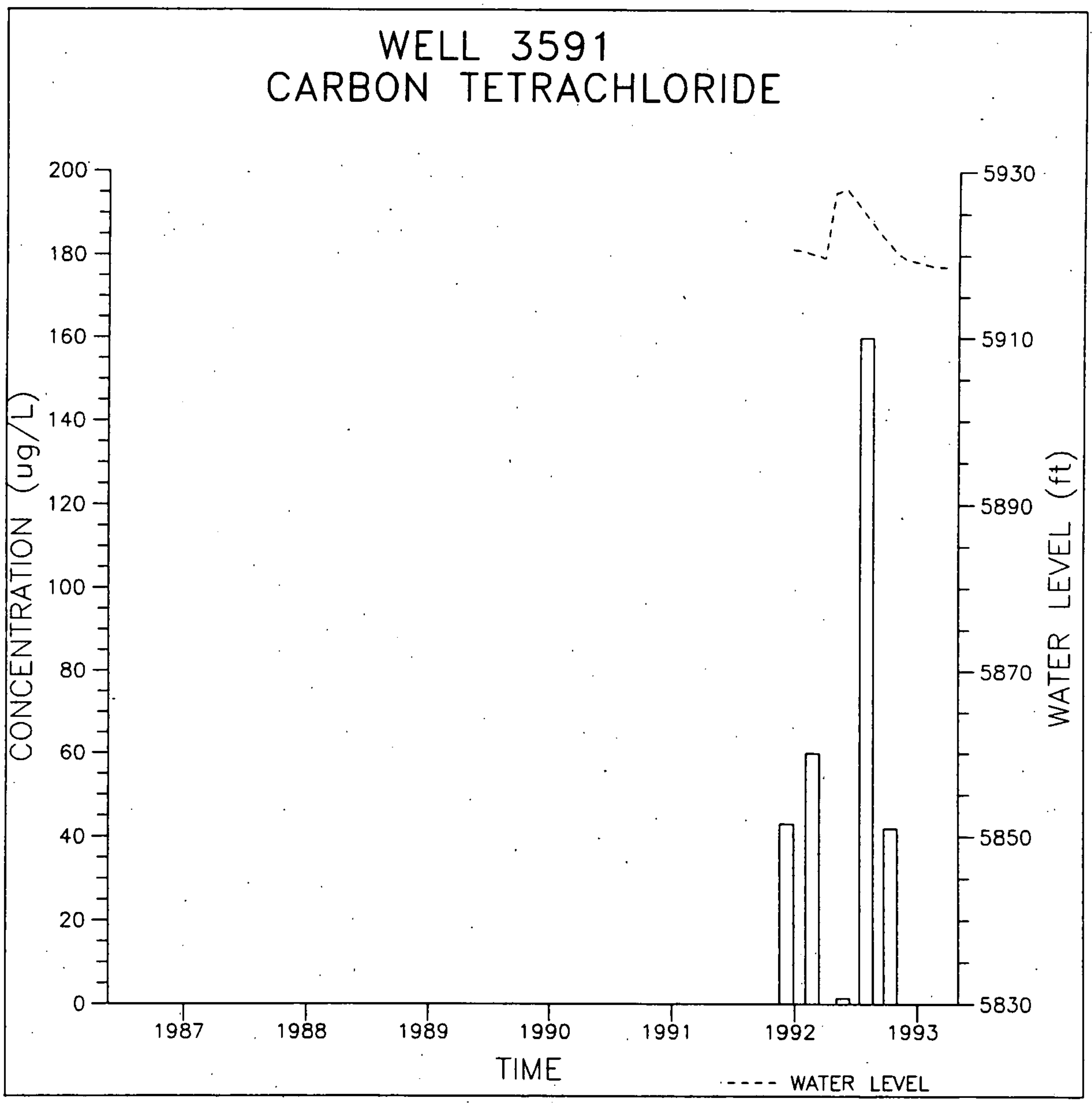


WELL P210189
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
25000
20000
15000
10000
5000
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

702


WELL 391
CARBON TETRACHLORIDE
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5920
5900
5880
5860
5840
5820
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

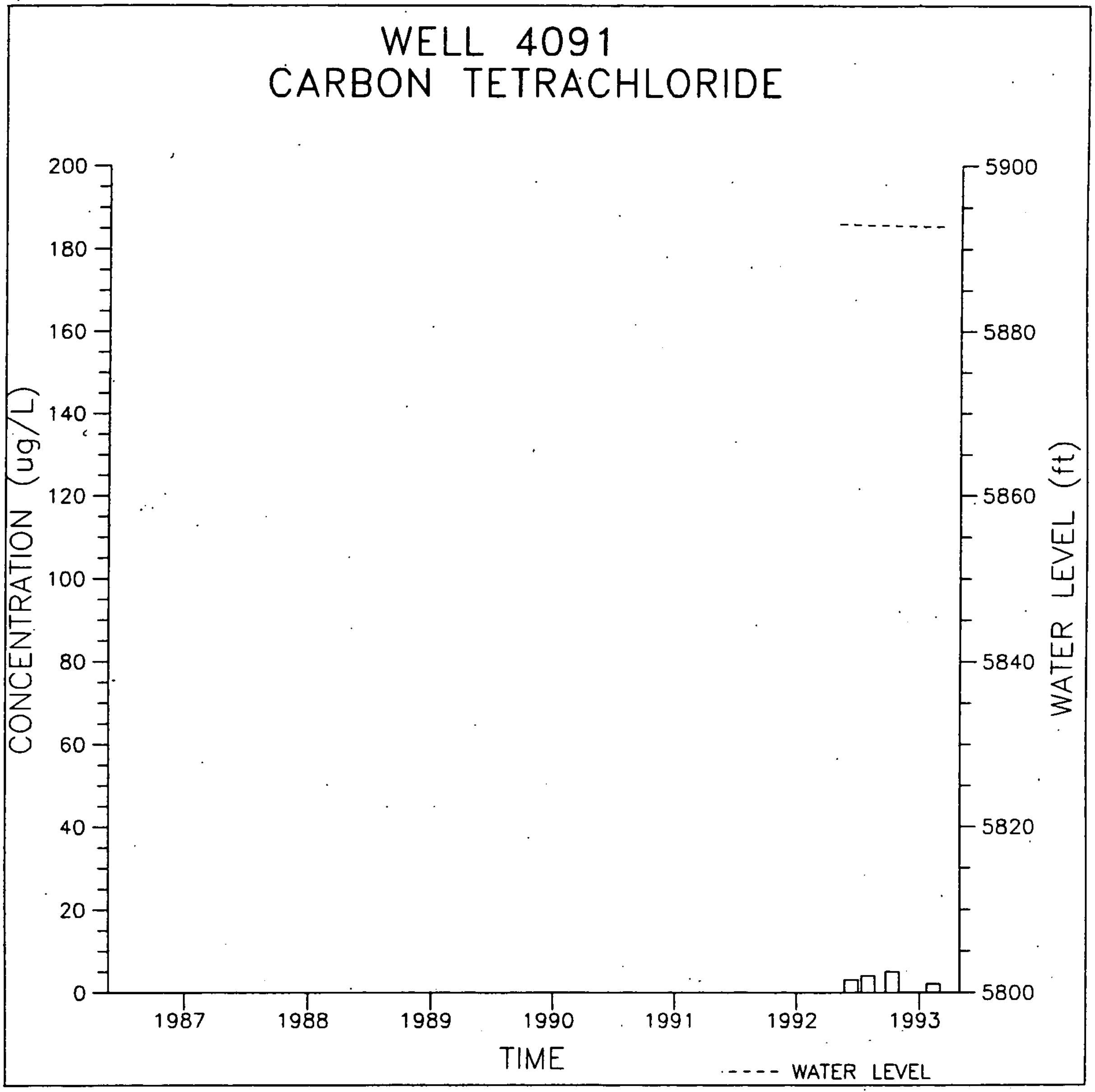
703



WELL 3591
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

704

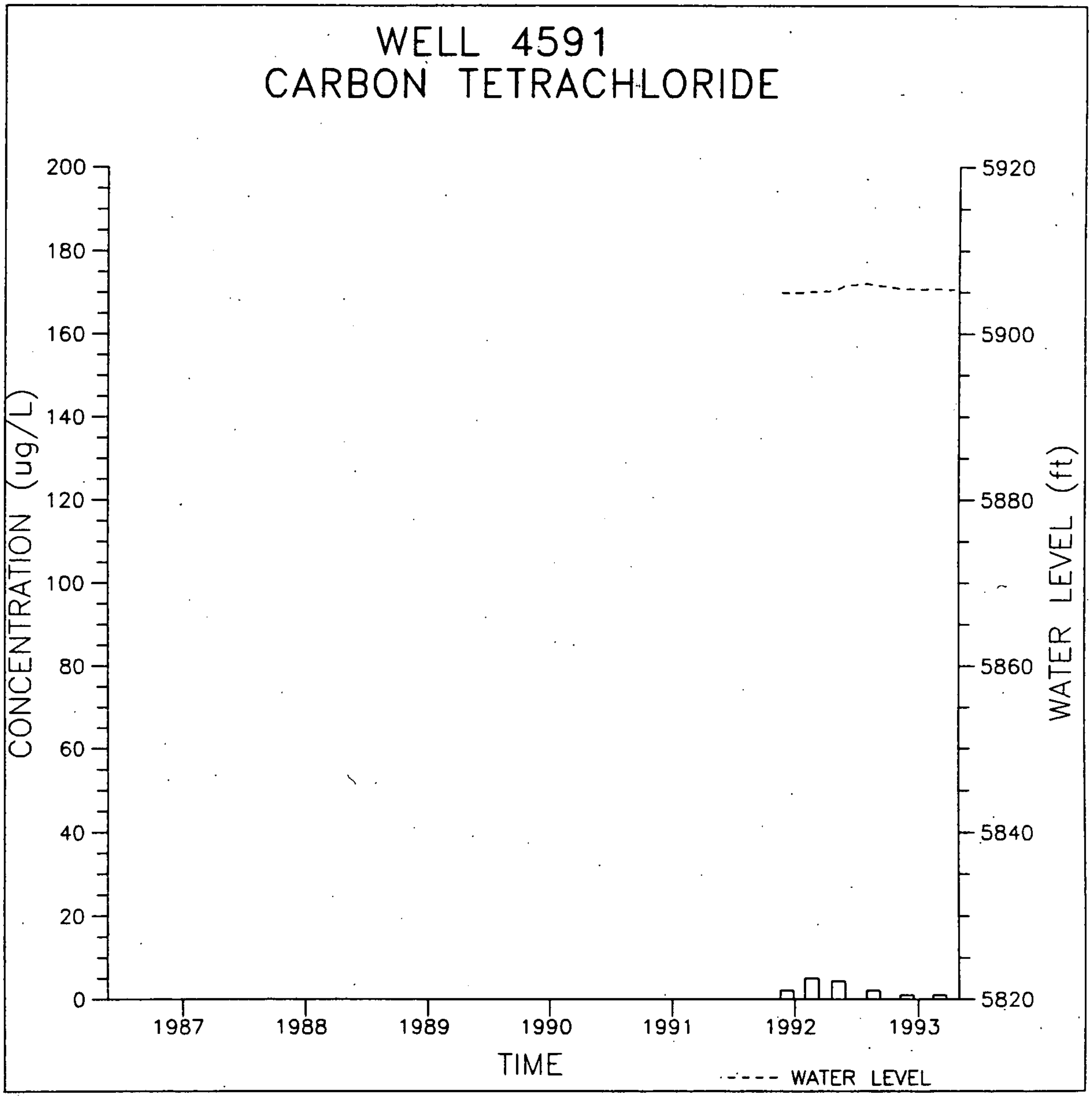
705



WELL 4091
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

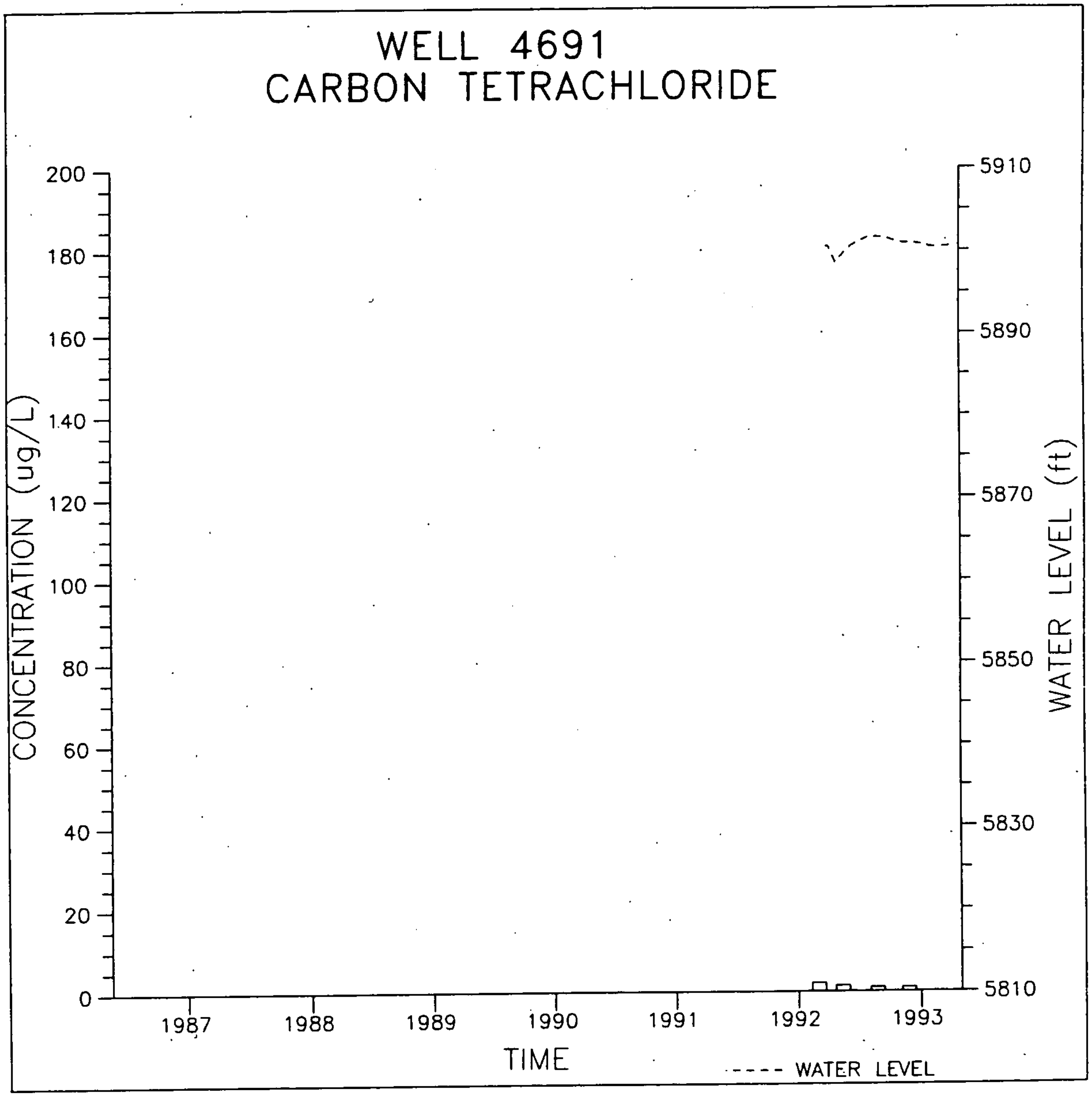
705

706


WELL 4591
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
1987
1988
1989
1990
1991
1992
1993
0
20
40
60
80
100
120
140
160
180
200
5820
5840
5860
5880
5900
5920
---- WATER LEVEL

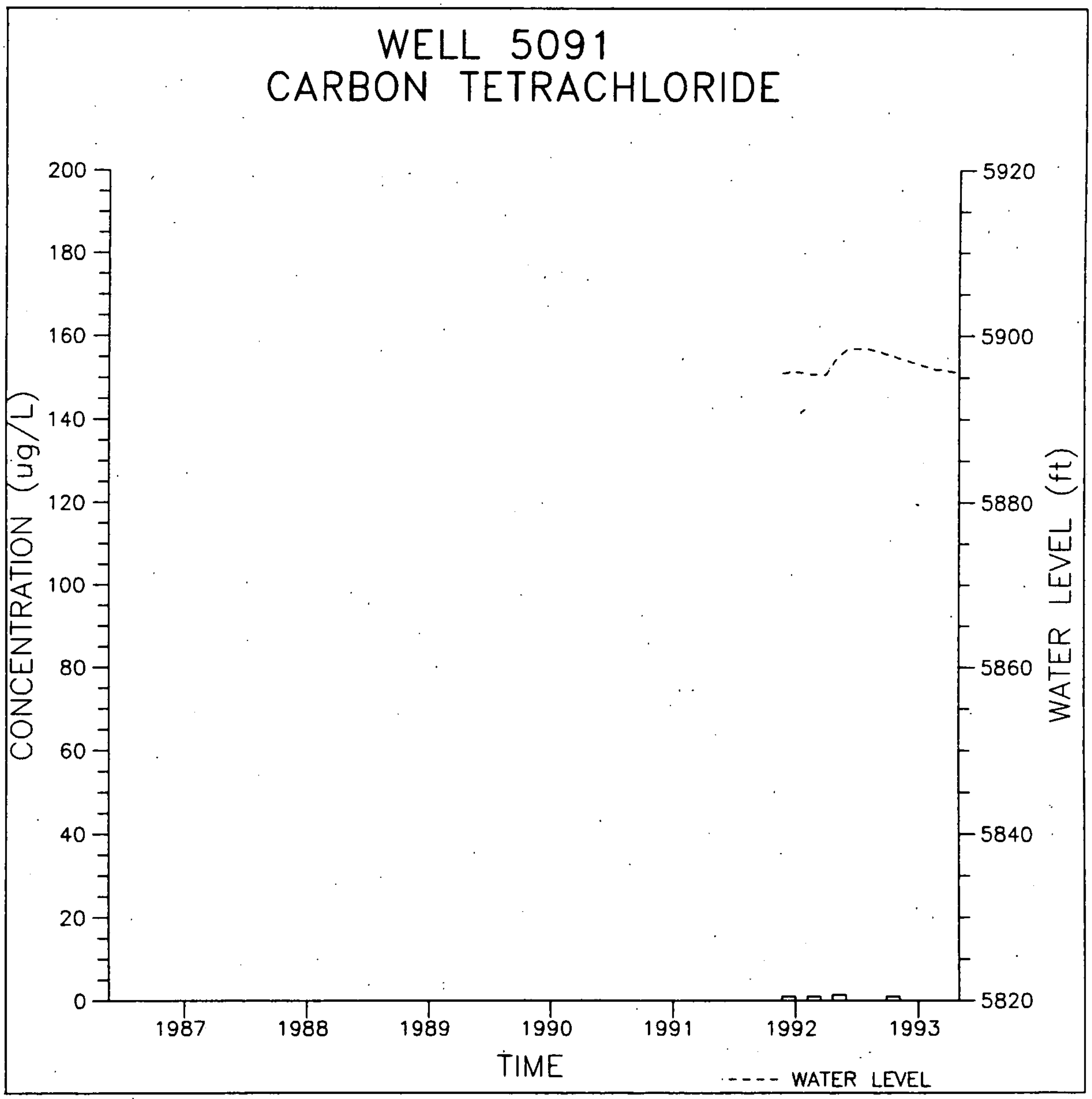
706

787



WELL 4691
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

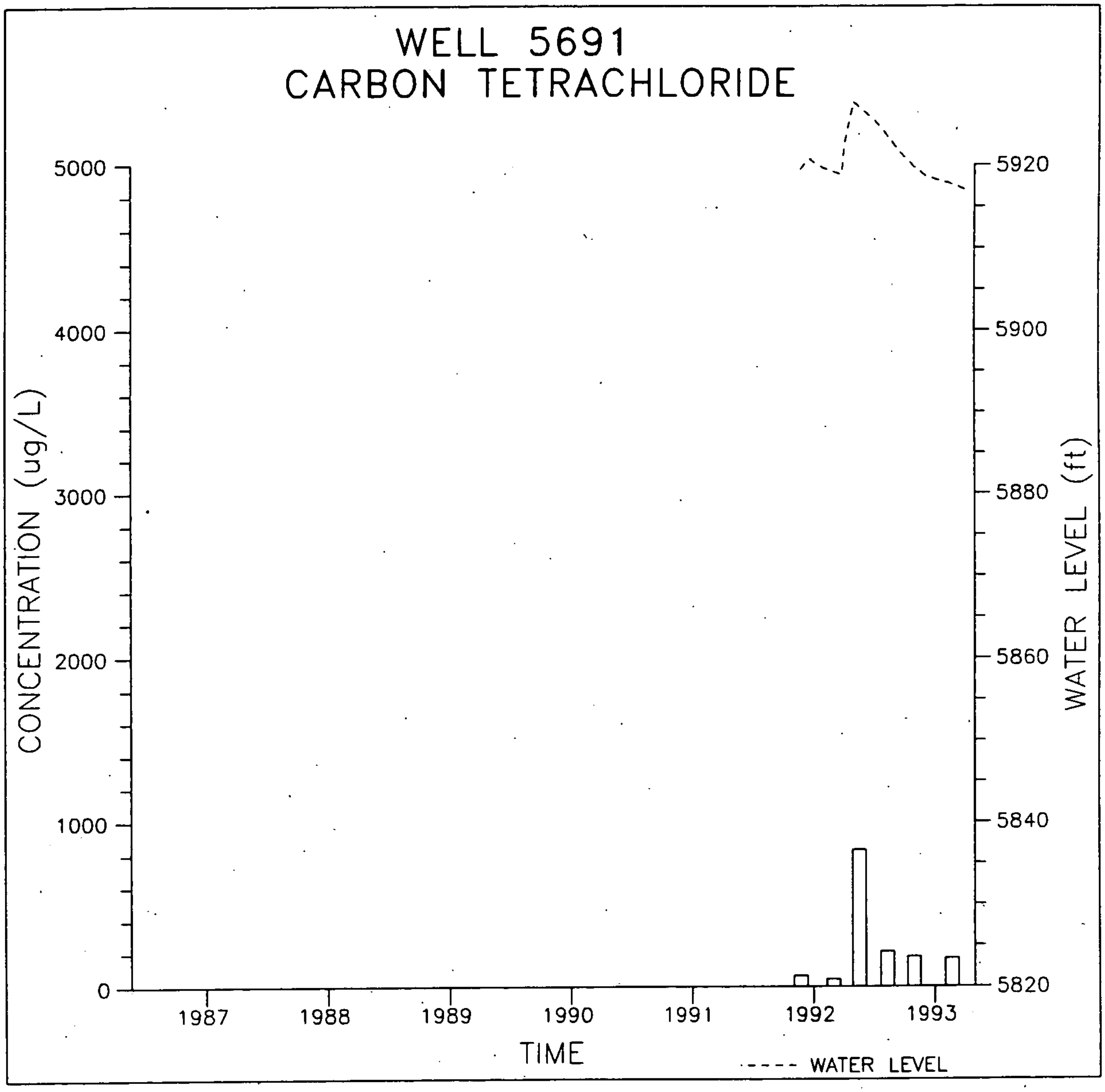
707



WELL 5091
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

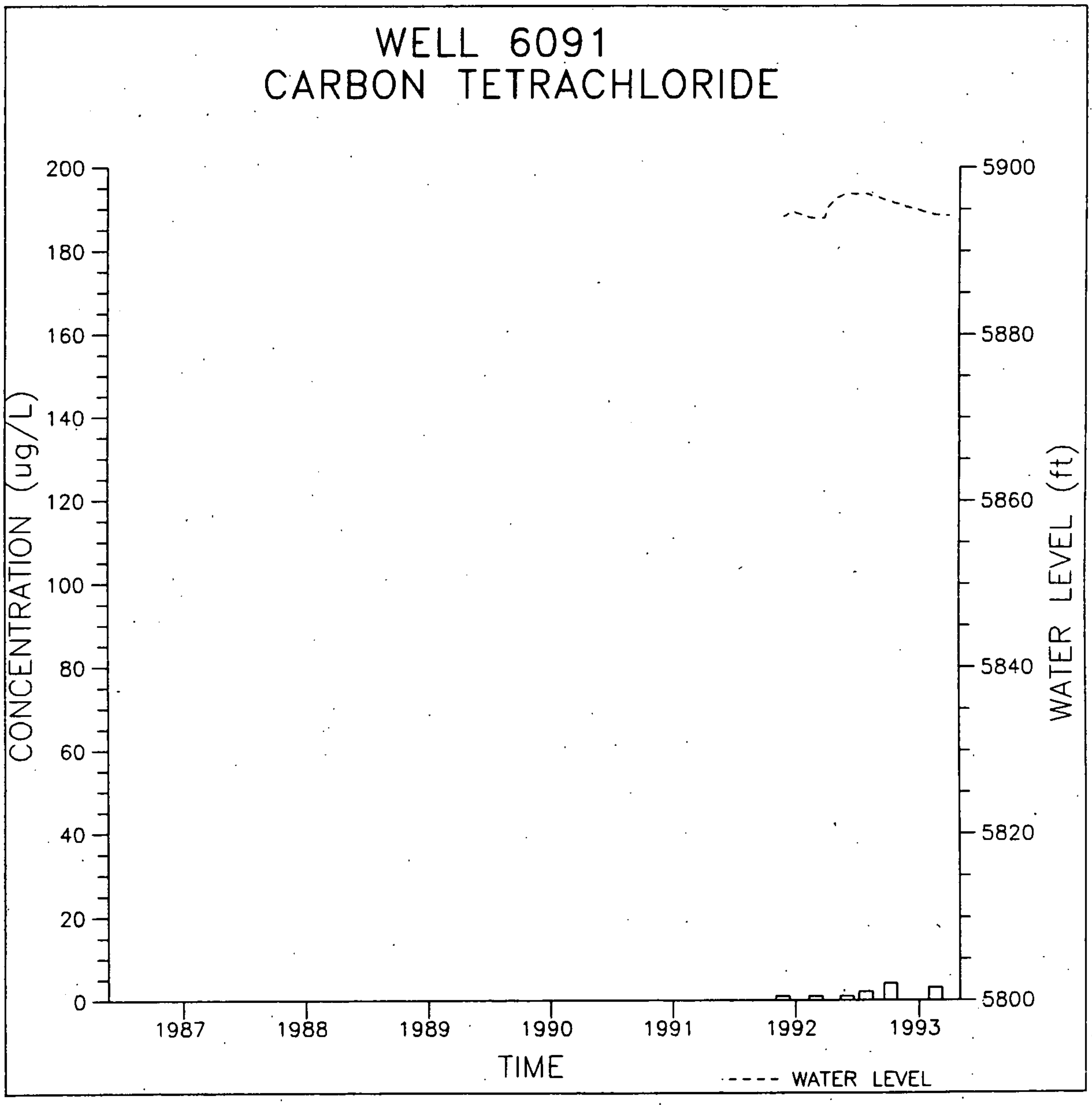
708

707


WELL 5691
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

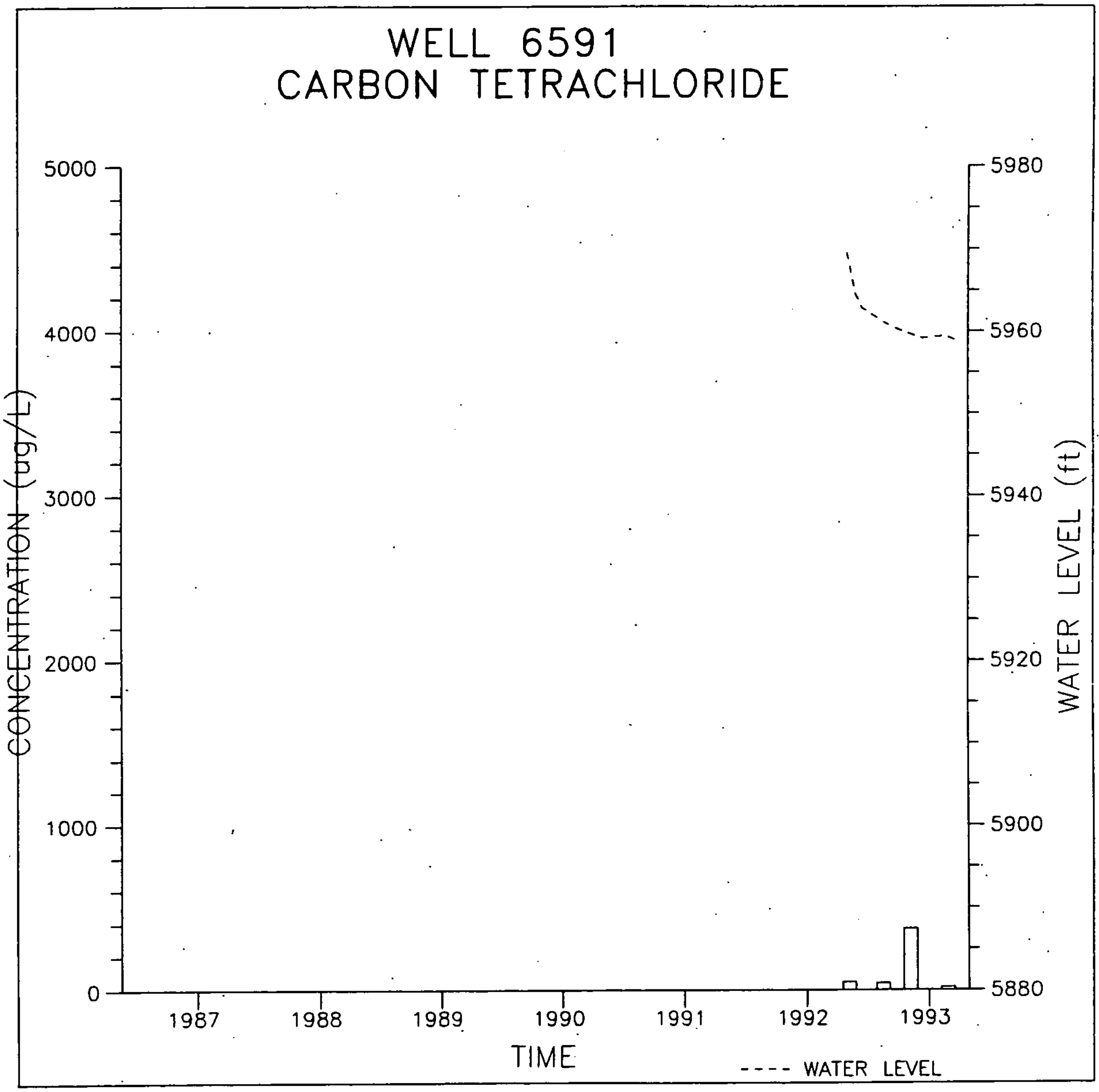
709

280

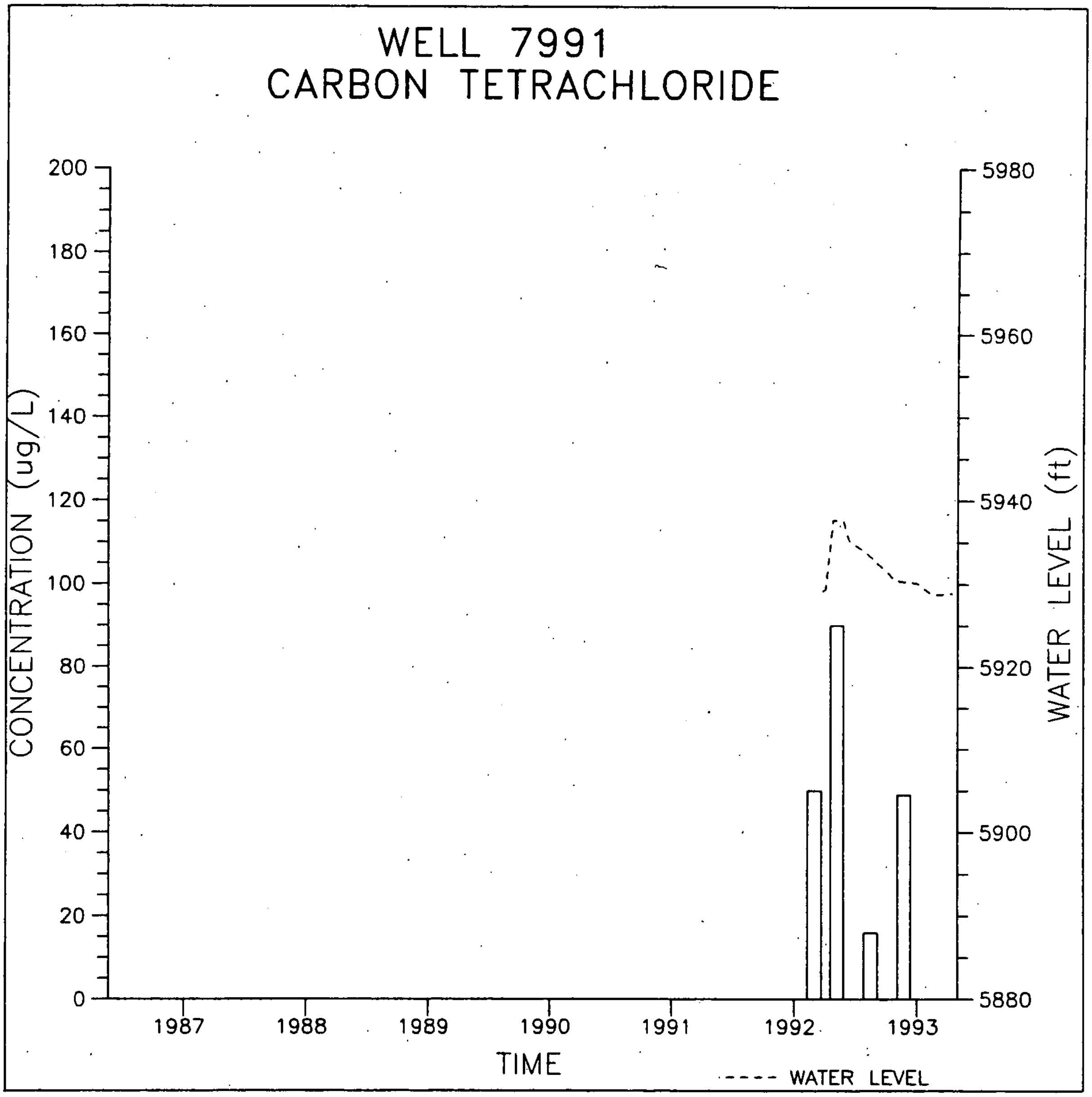

WELL 6091
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

710

7H

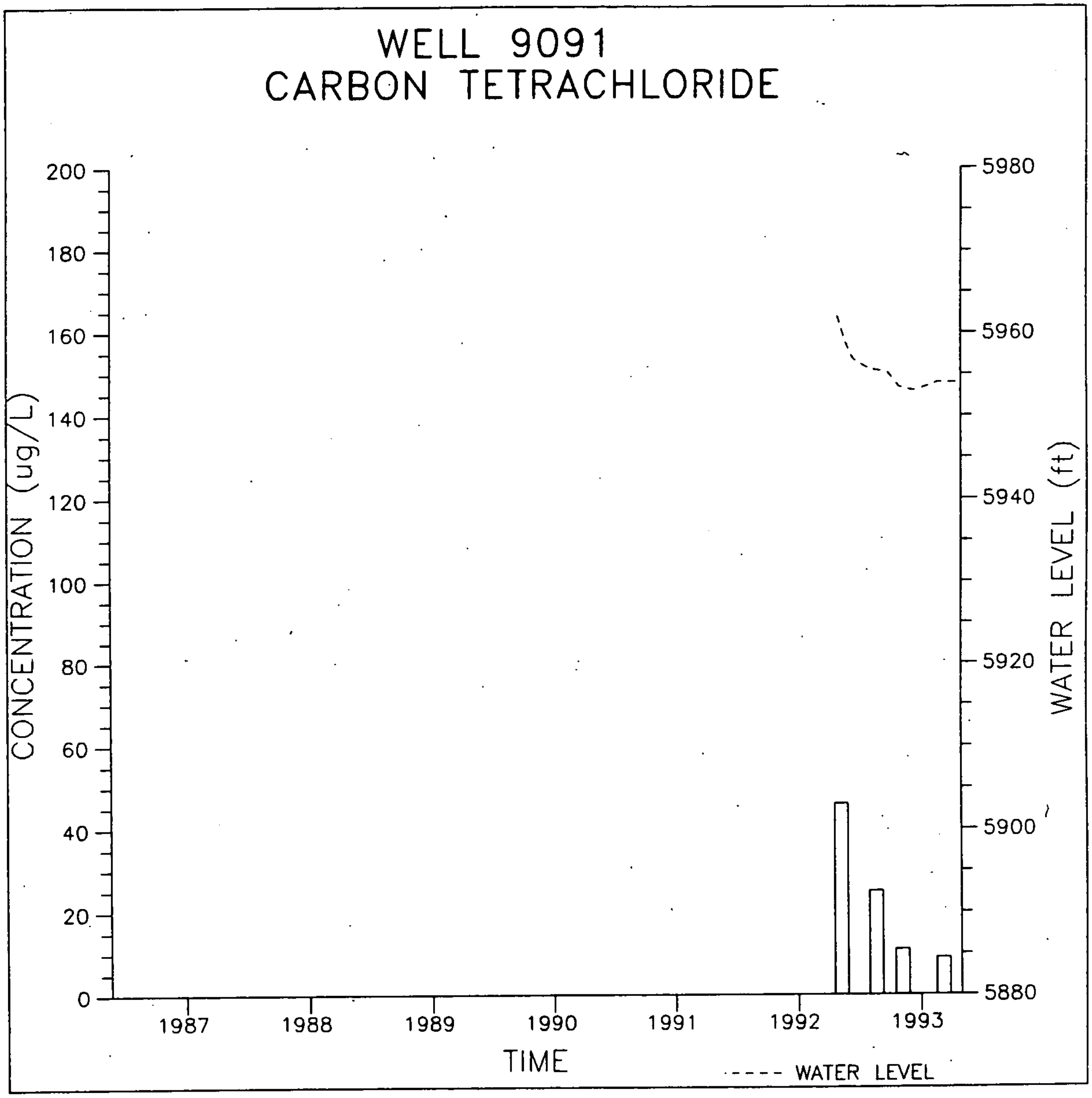

WELL 6591
CARBON TETRACHLORIDE
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

711

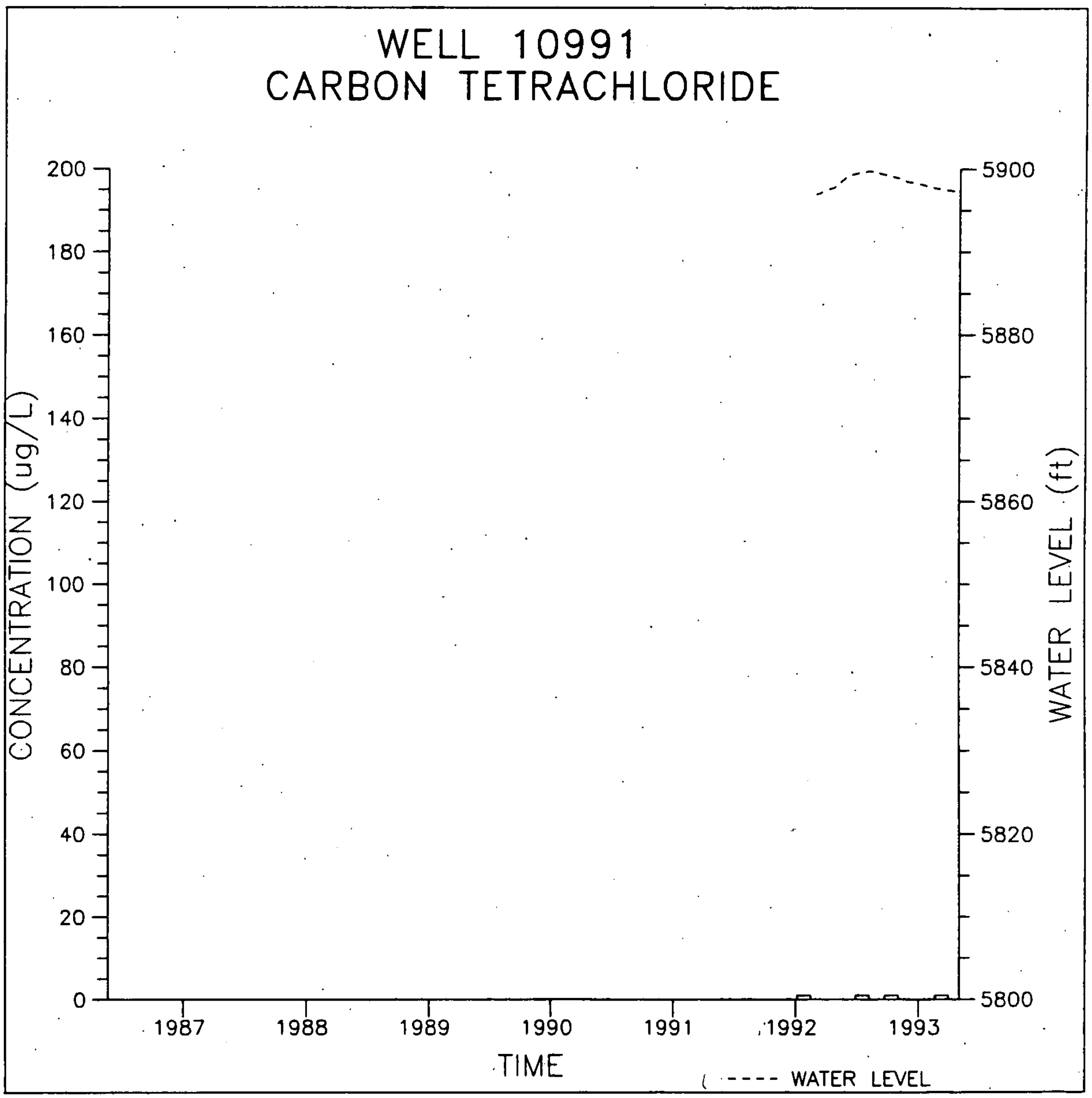


WELL 7991
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

712

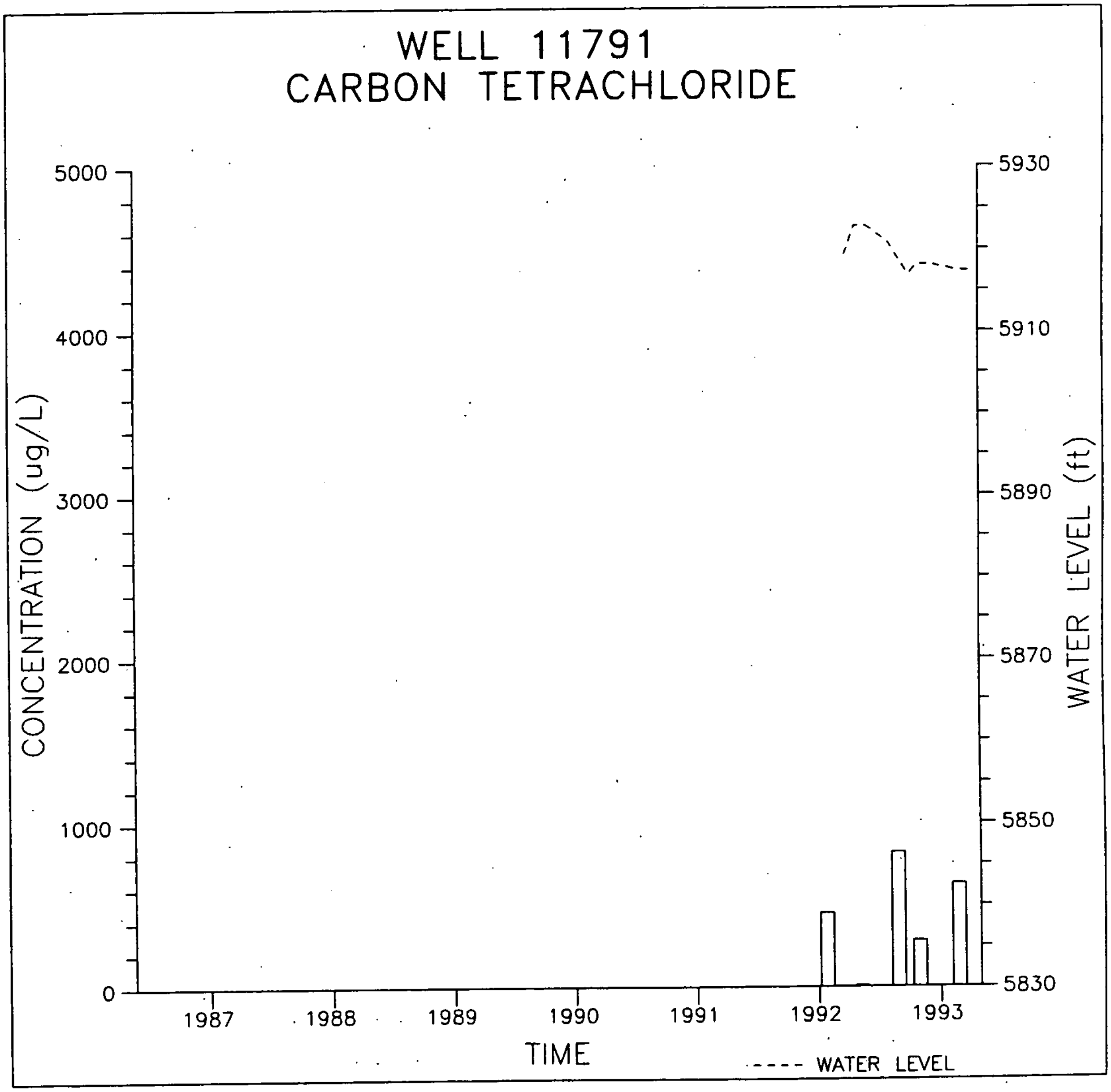

WELL 9091
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

713


WELL 10991
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

714

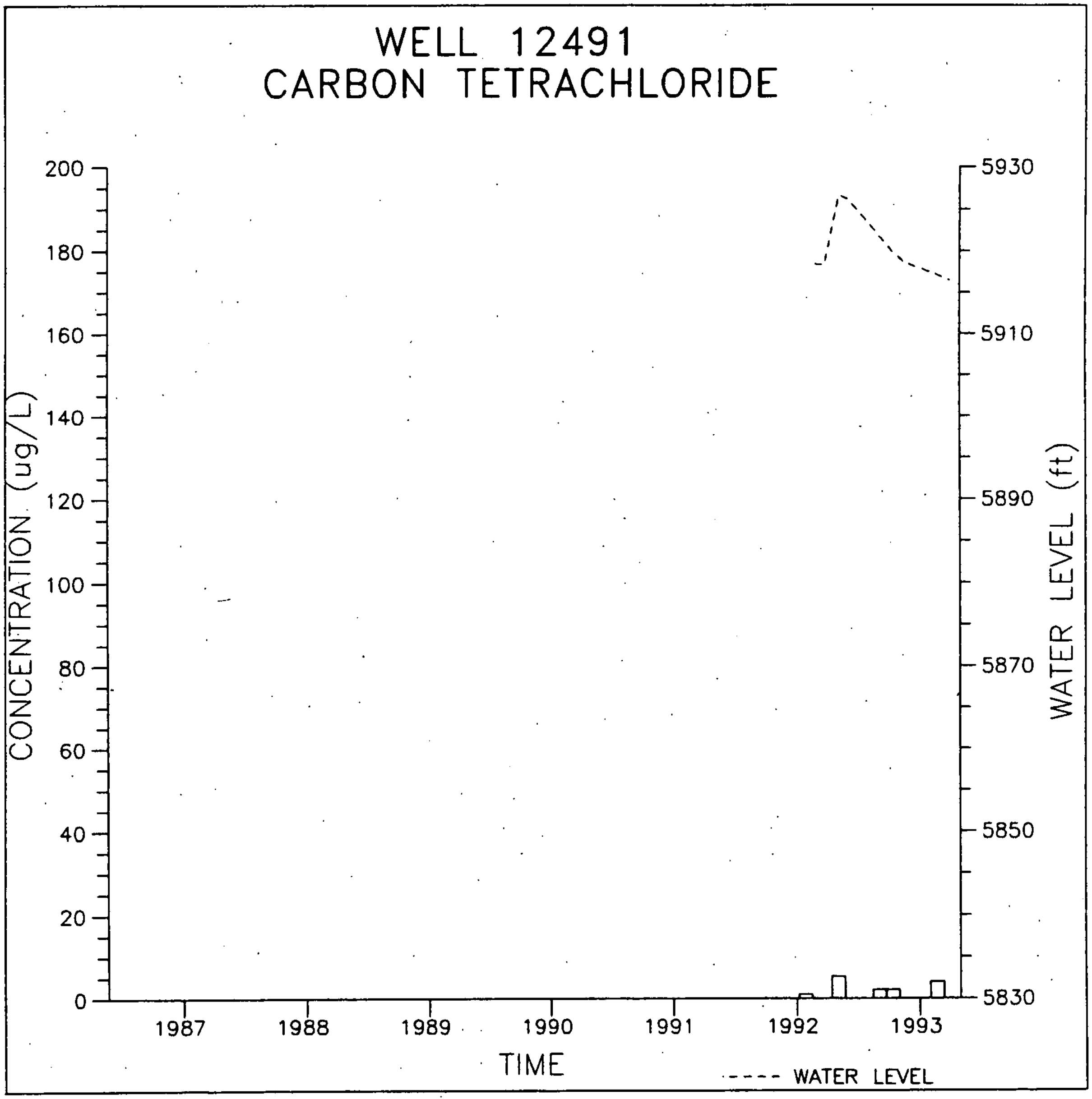
285



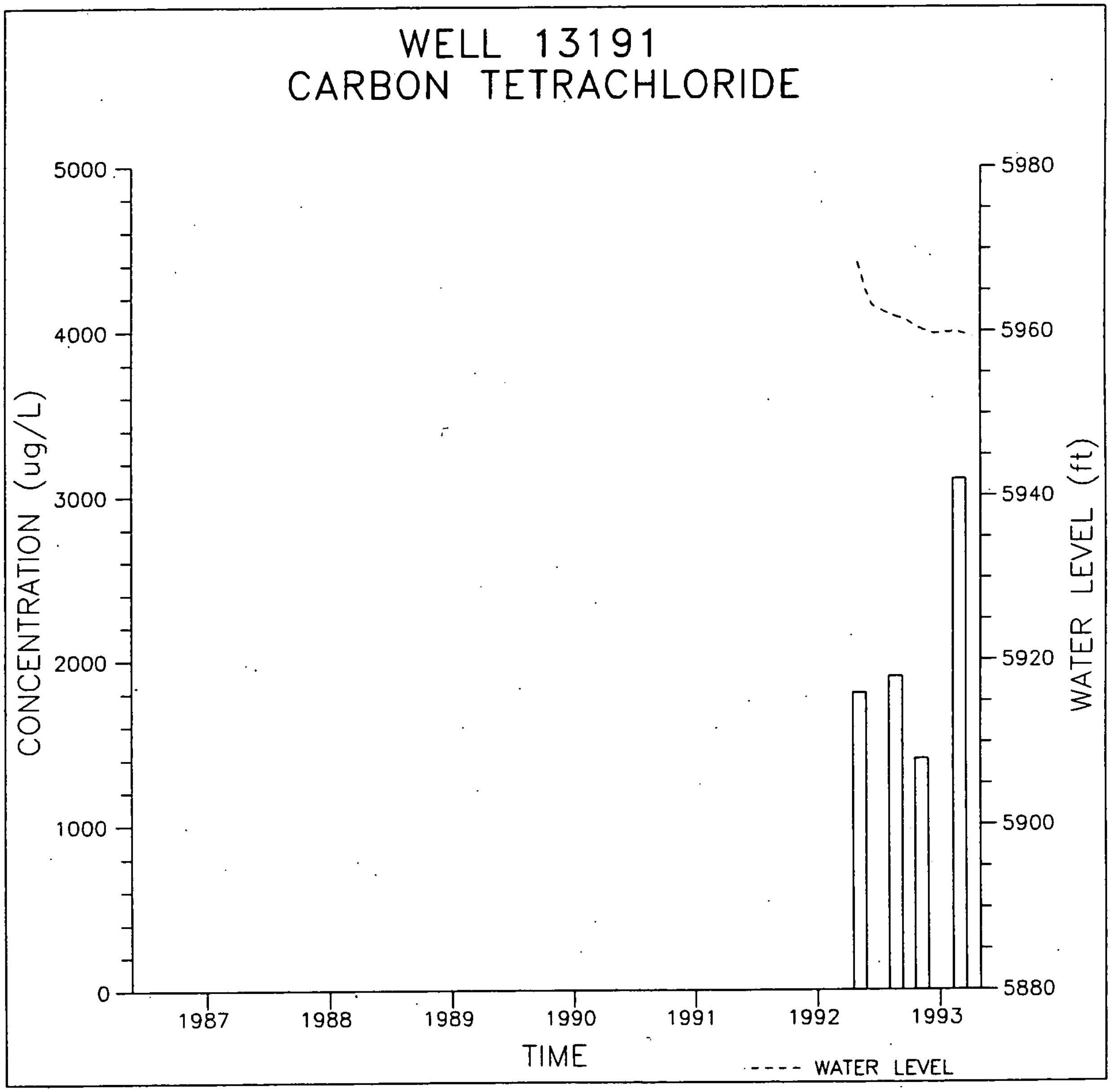
WELL 11791
CARBON TETRACHLORIDE
5000
4000
3000
2000
1000
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

715

7156

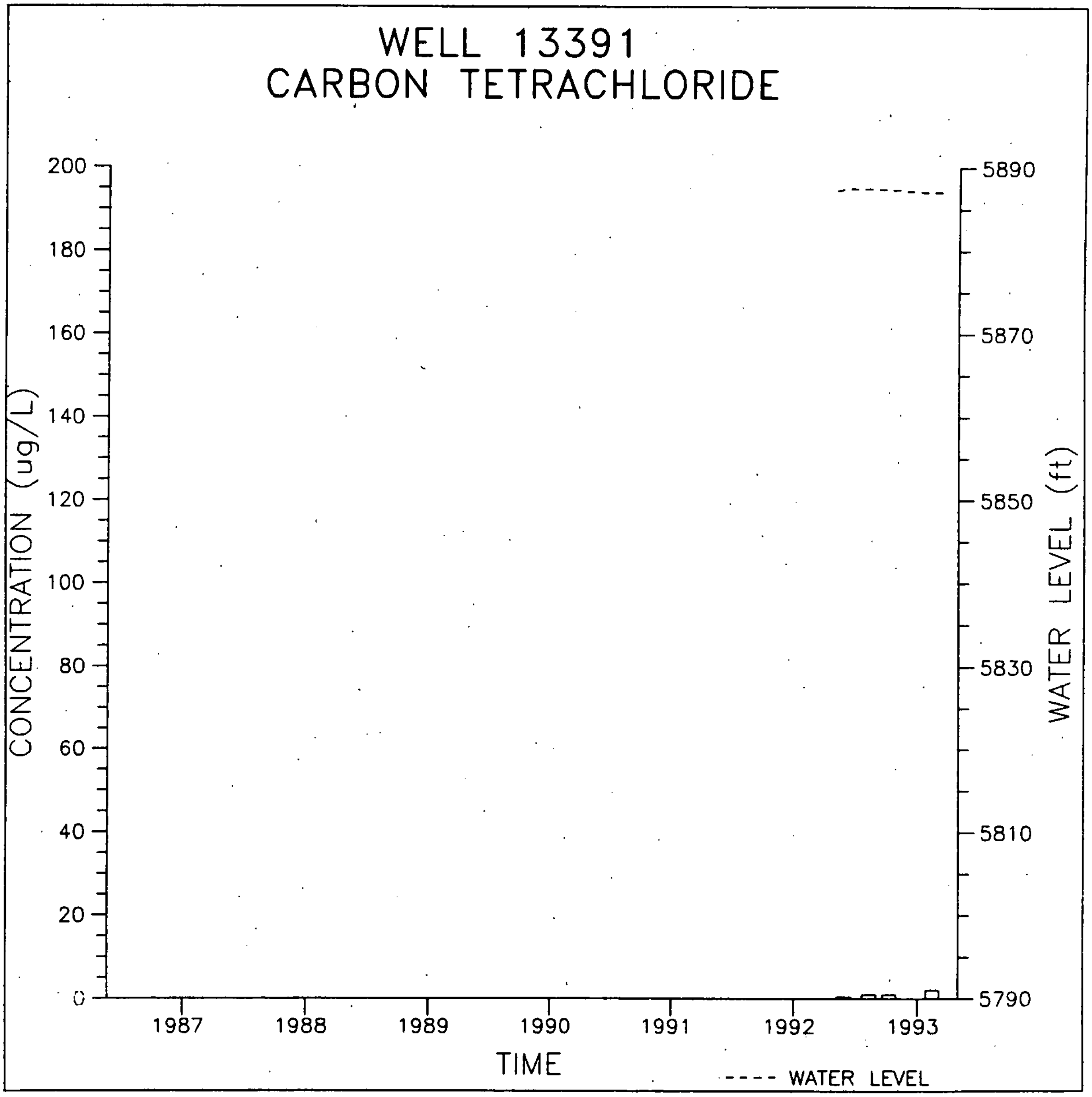

WELL 12491
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

716



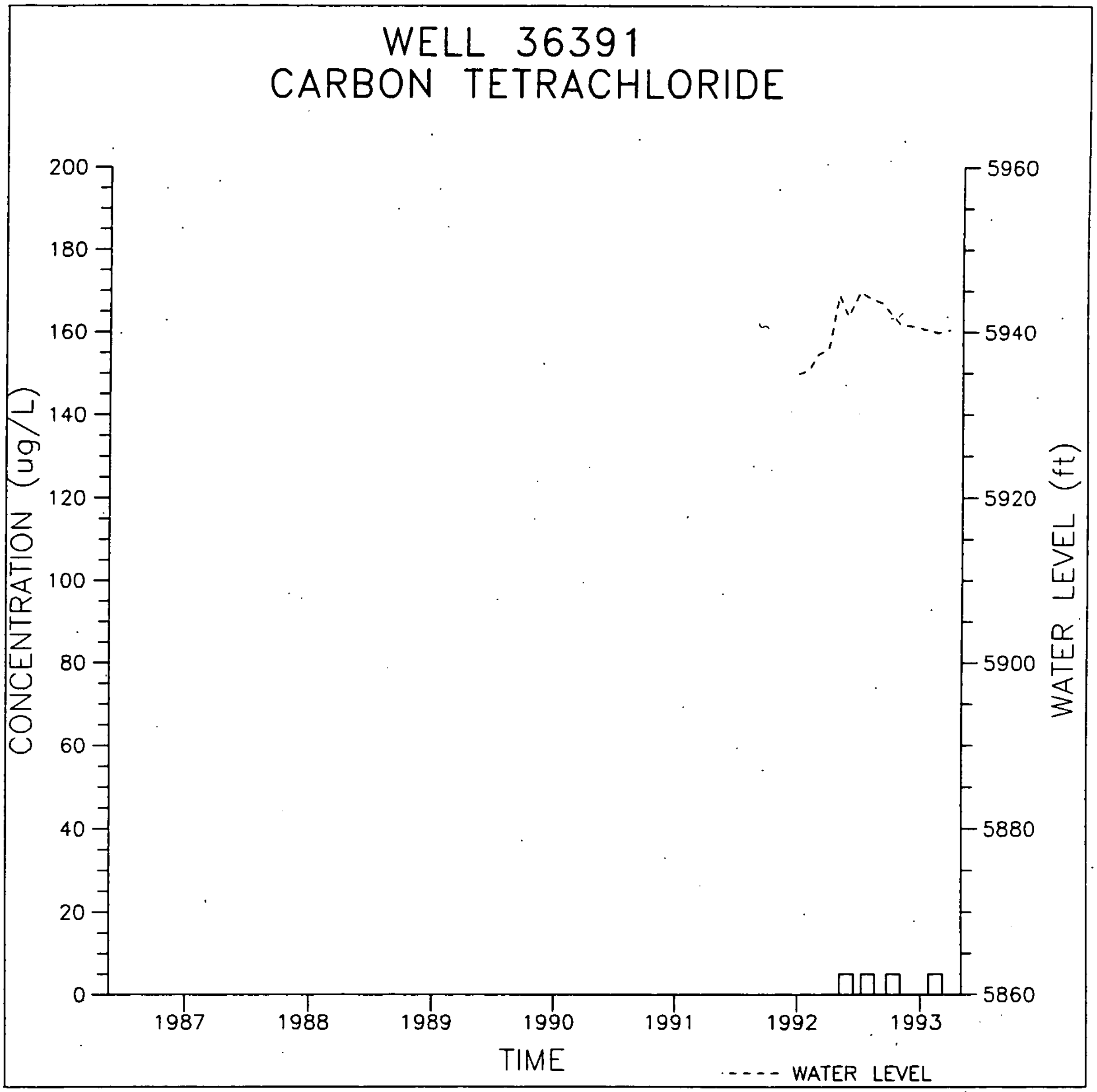
WELL 13191
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

717


WELL 13391
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993

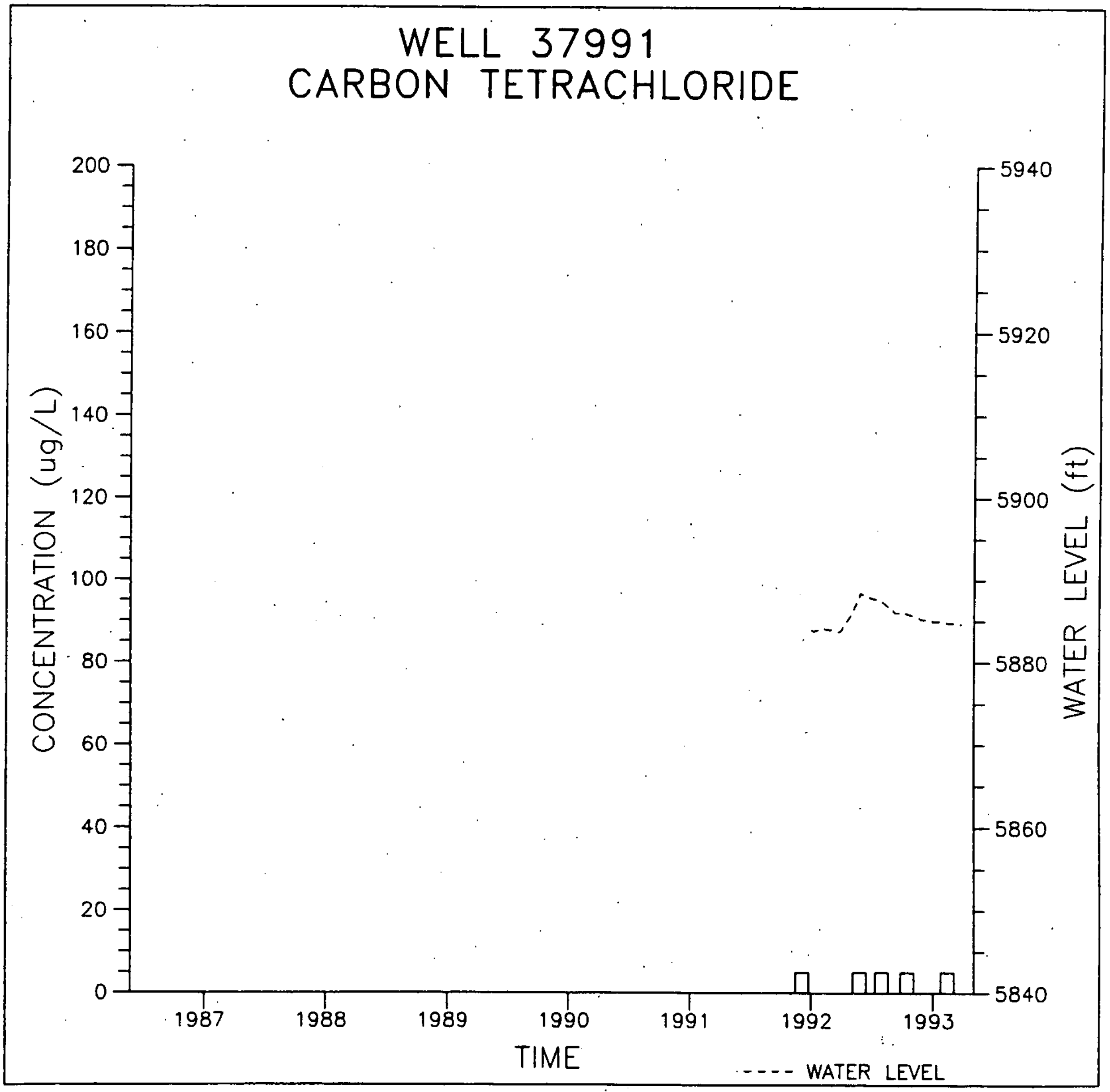
718

708



WELL 36391
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

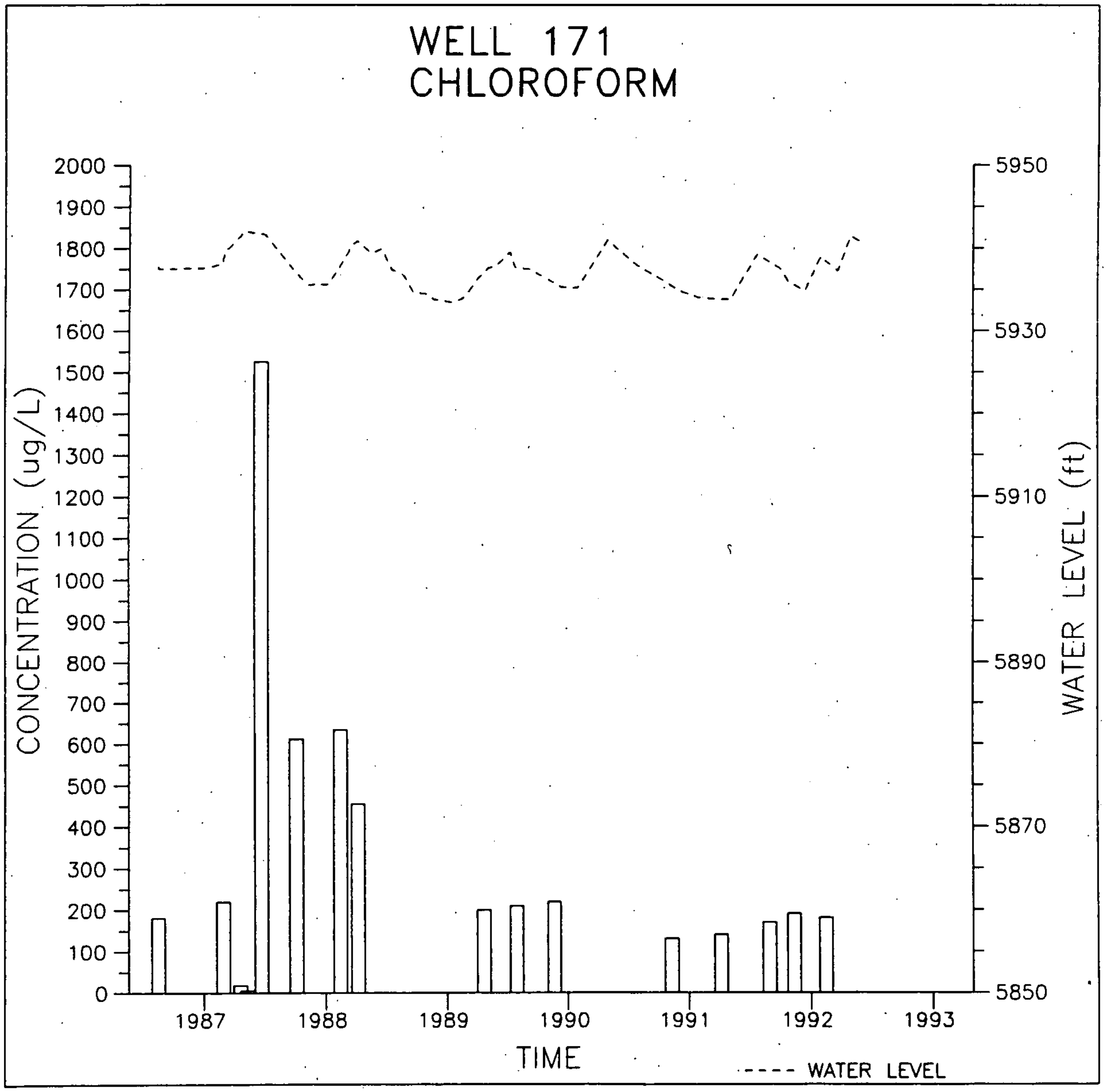
719



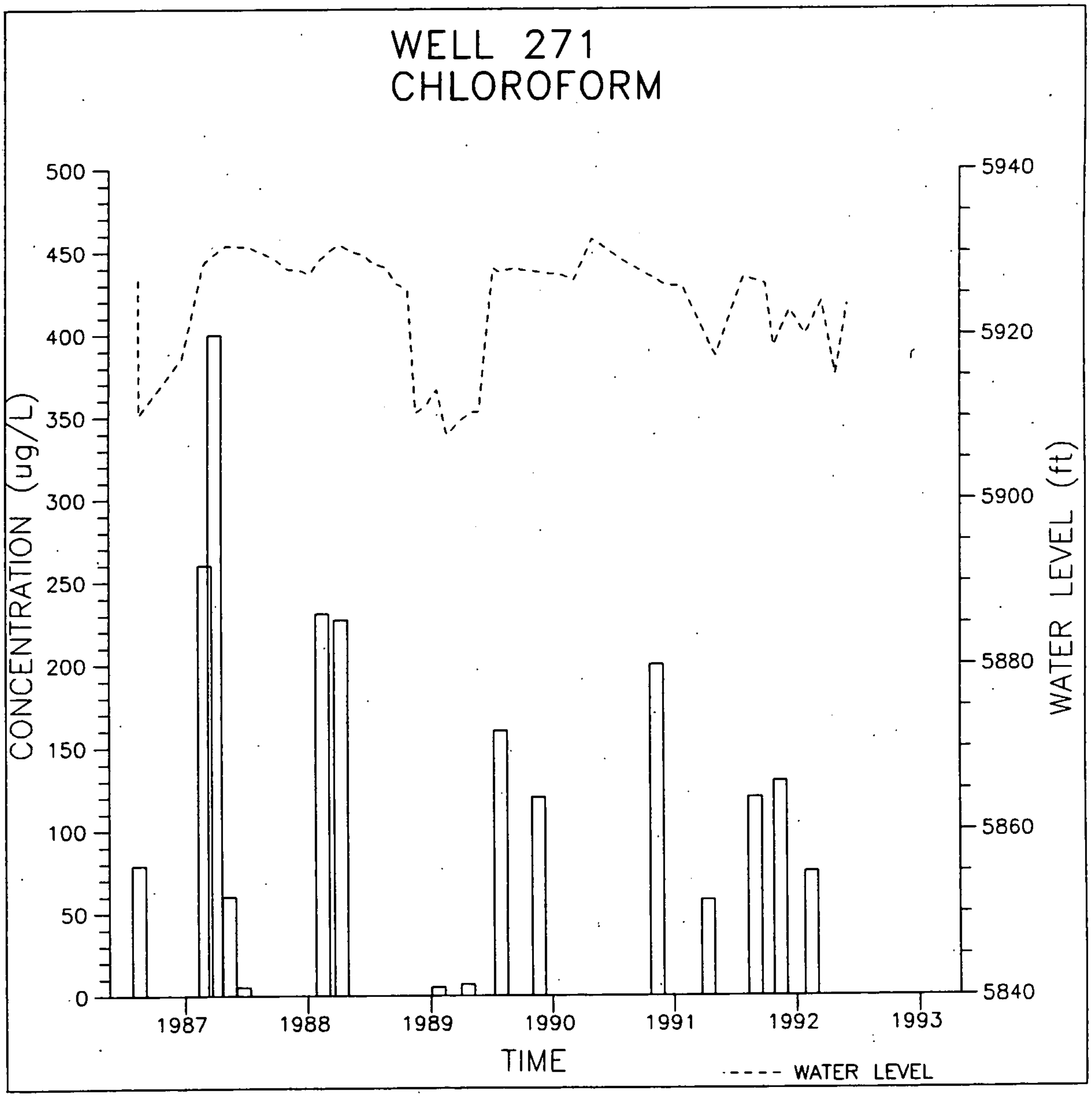
WELL 37991
CARBON TETRACHLORIDE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

720

281

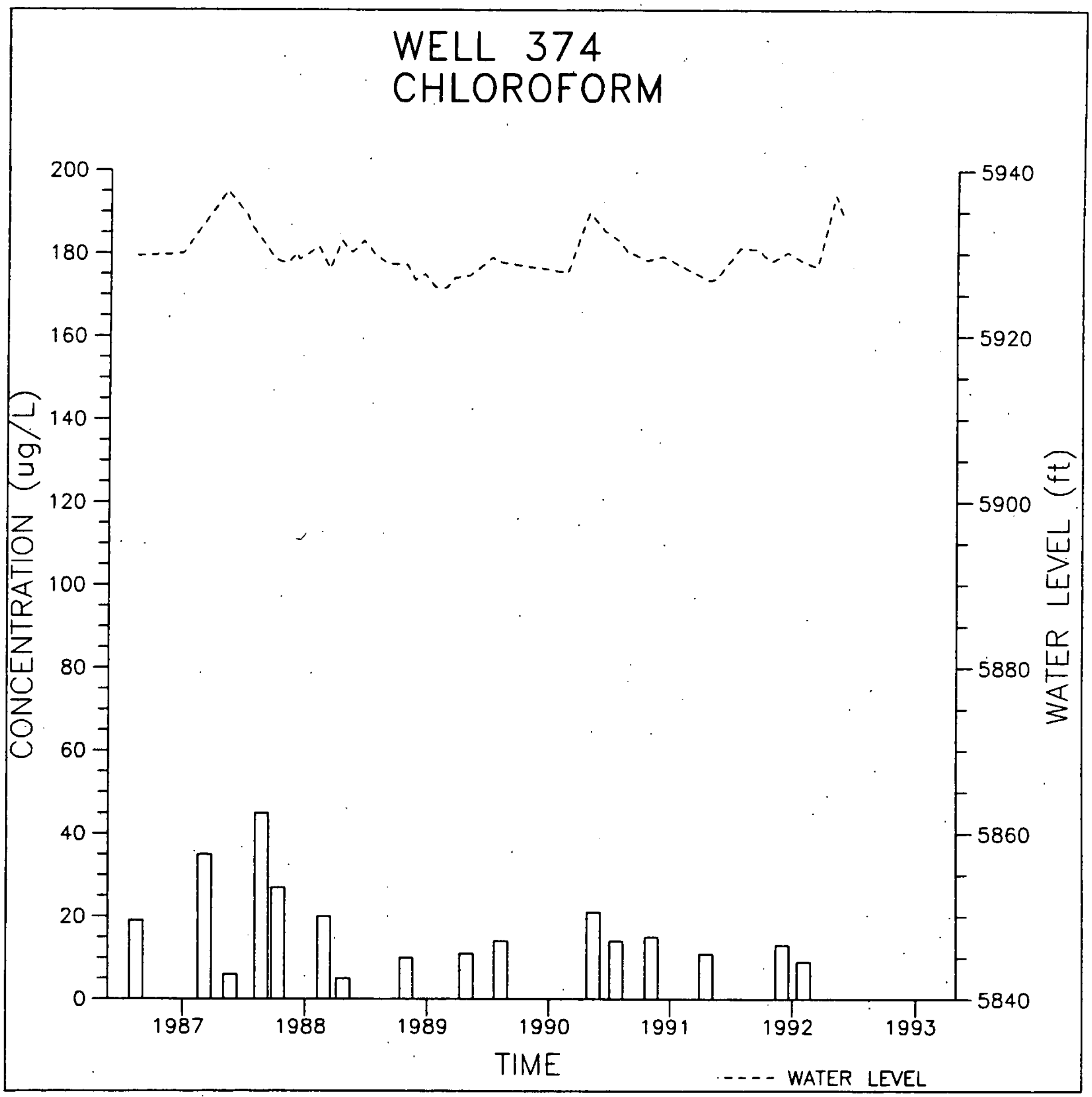

WELL 171
CHLOROFORM
CONCENTRATION (ug/L)
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

721



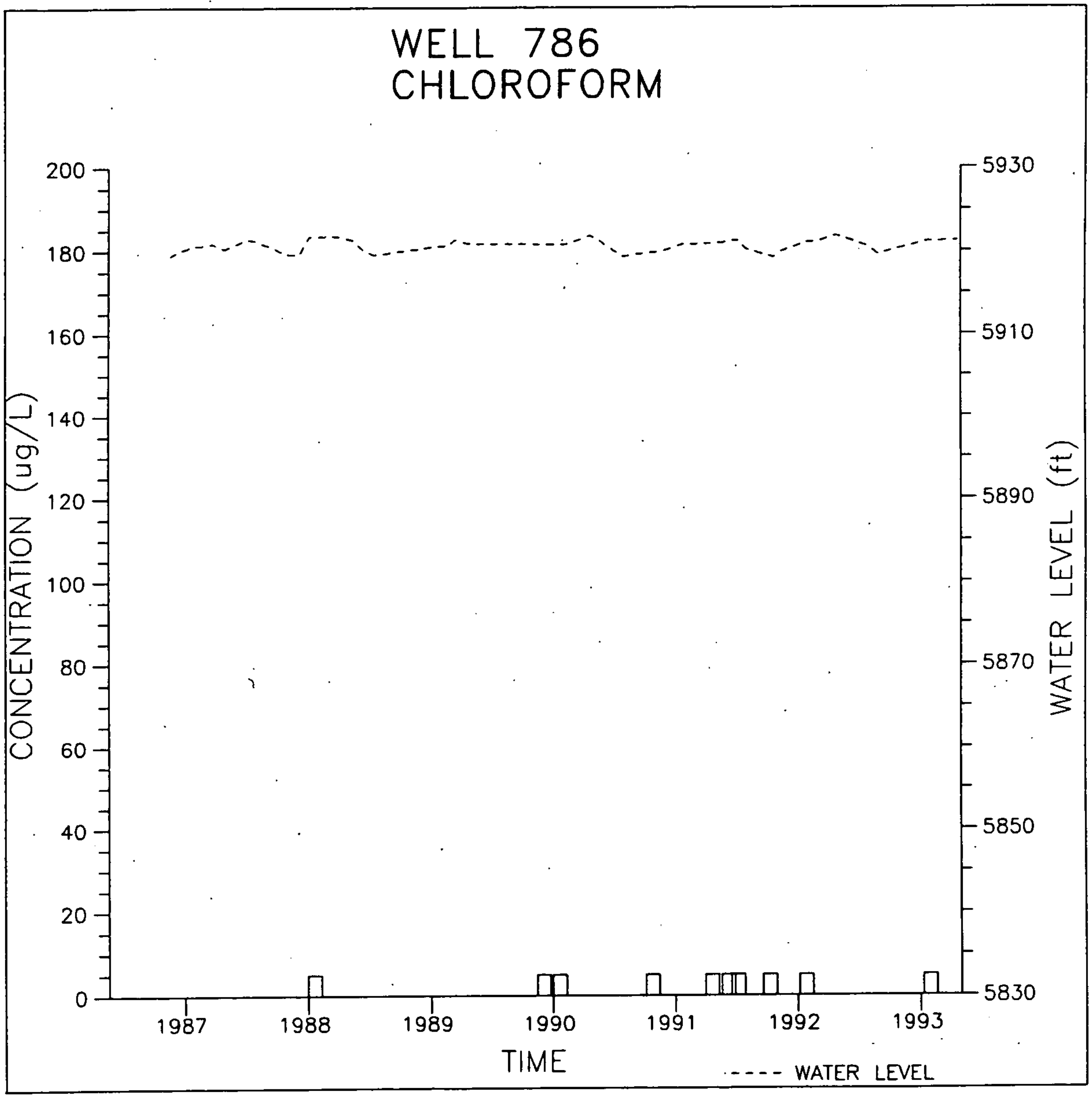
WELL 271
CHLOROFORM
500
450
400
350
300
250
200
150
100
50
0
CONCENTRATION (ug/L)
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

8722

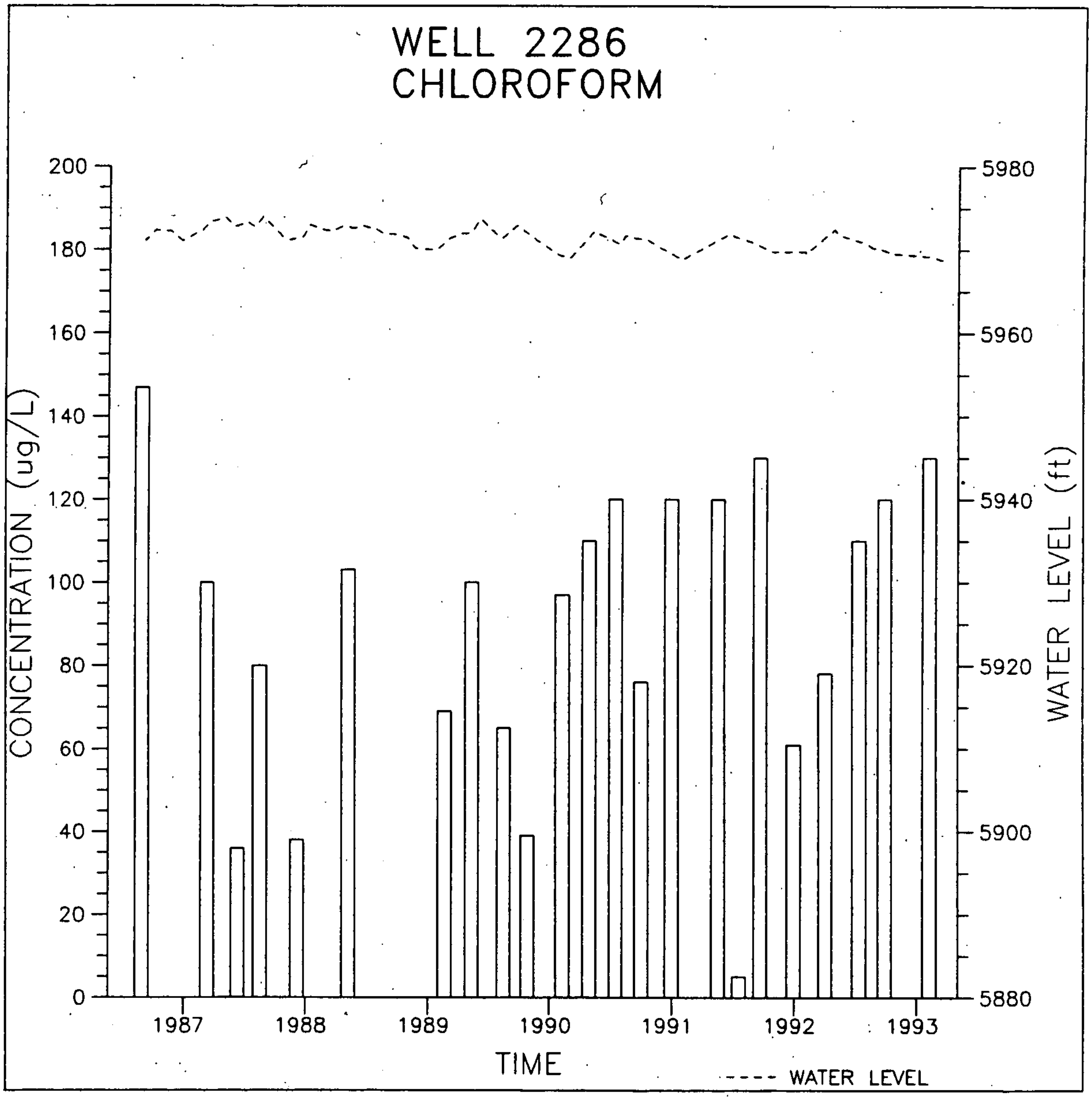


WELL 374
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20
40
60
80
100
120
140
160
180
200
5840
5860
5880
5900
5920
5940
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

723


WELL 786
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

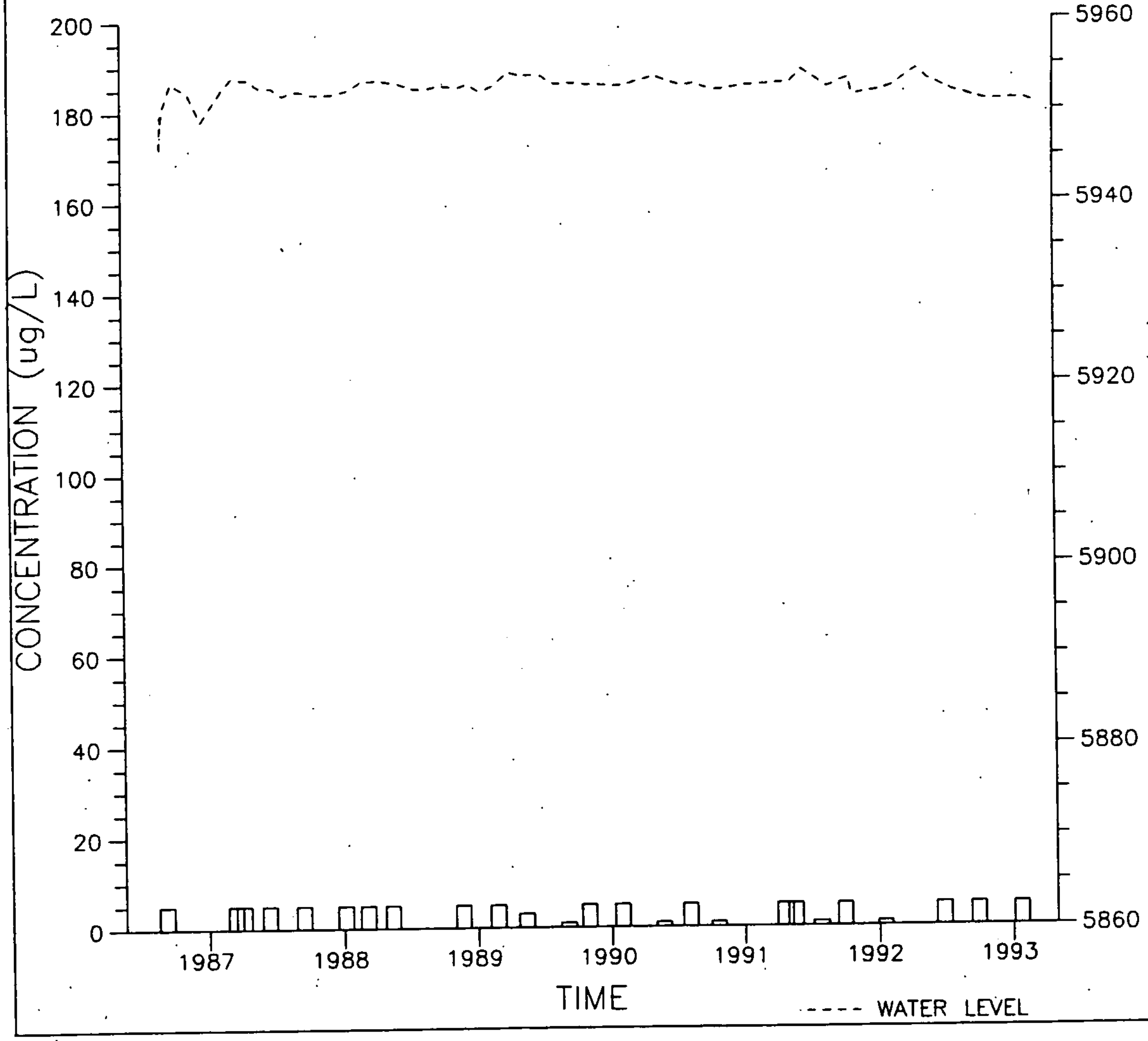
724



WELL 2286
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

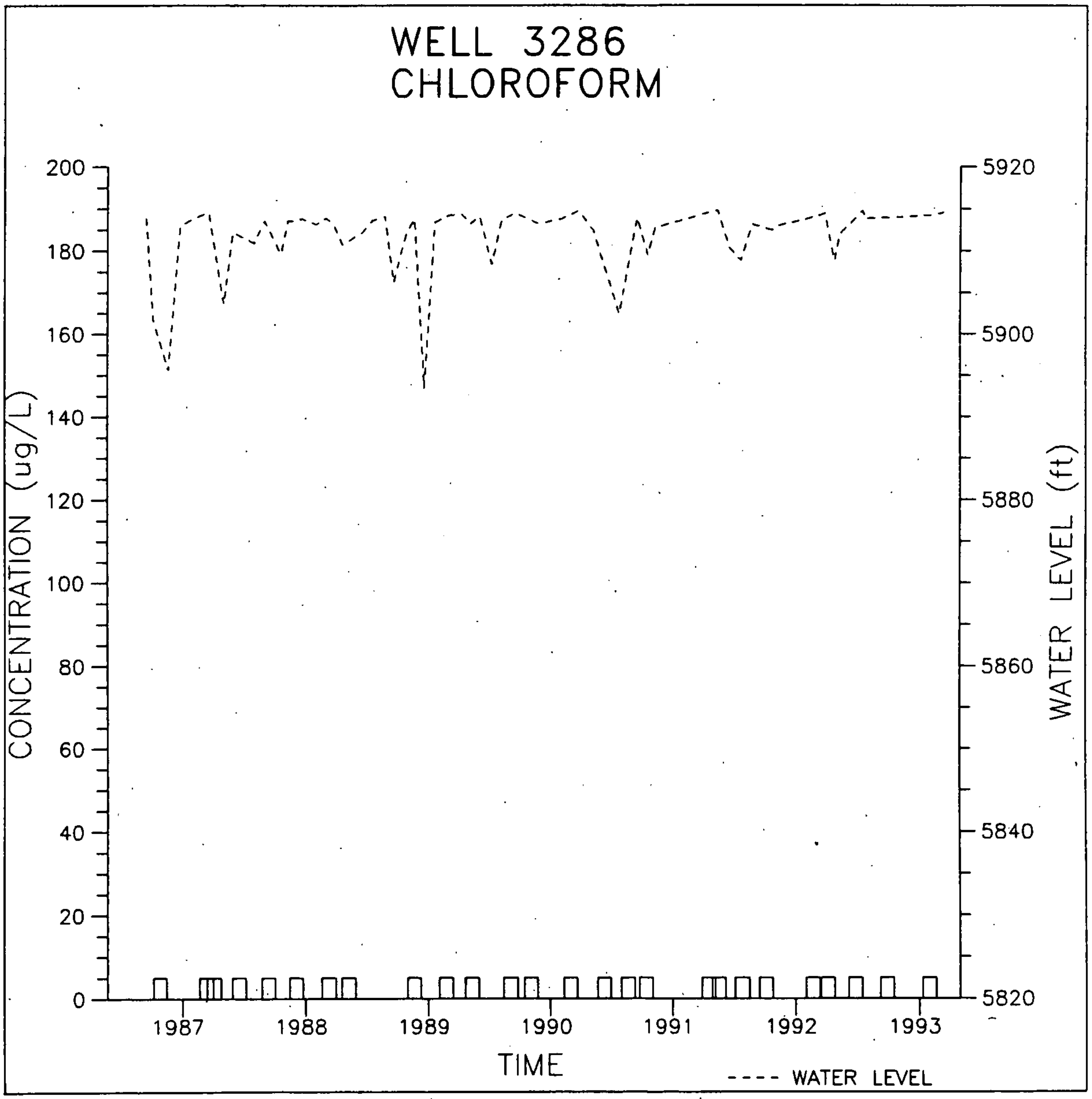
725

WELL 3086
CHLOROFORM



726

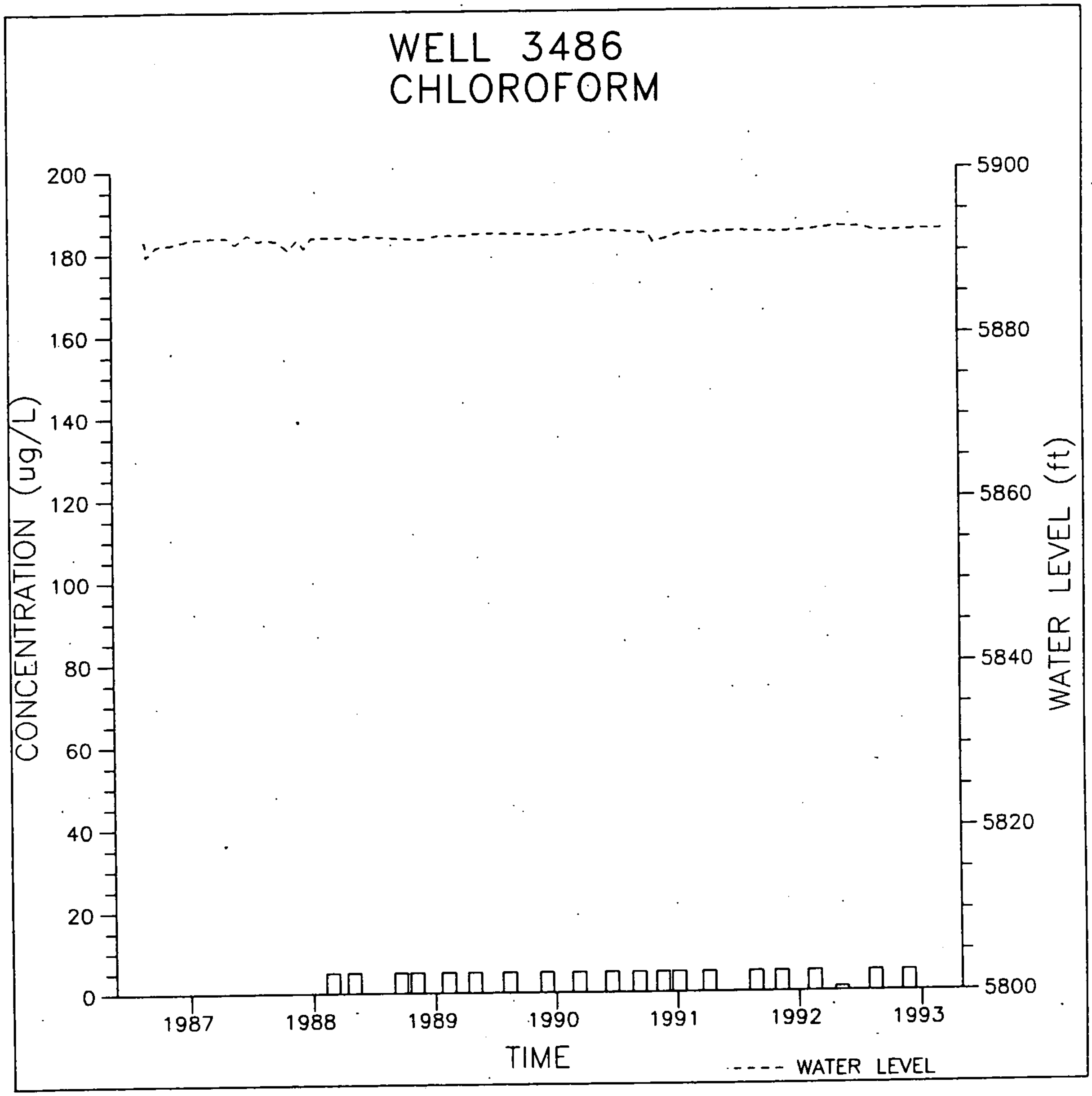
727



WELL 3286
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

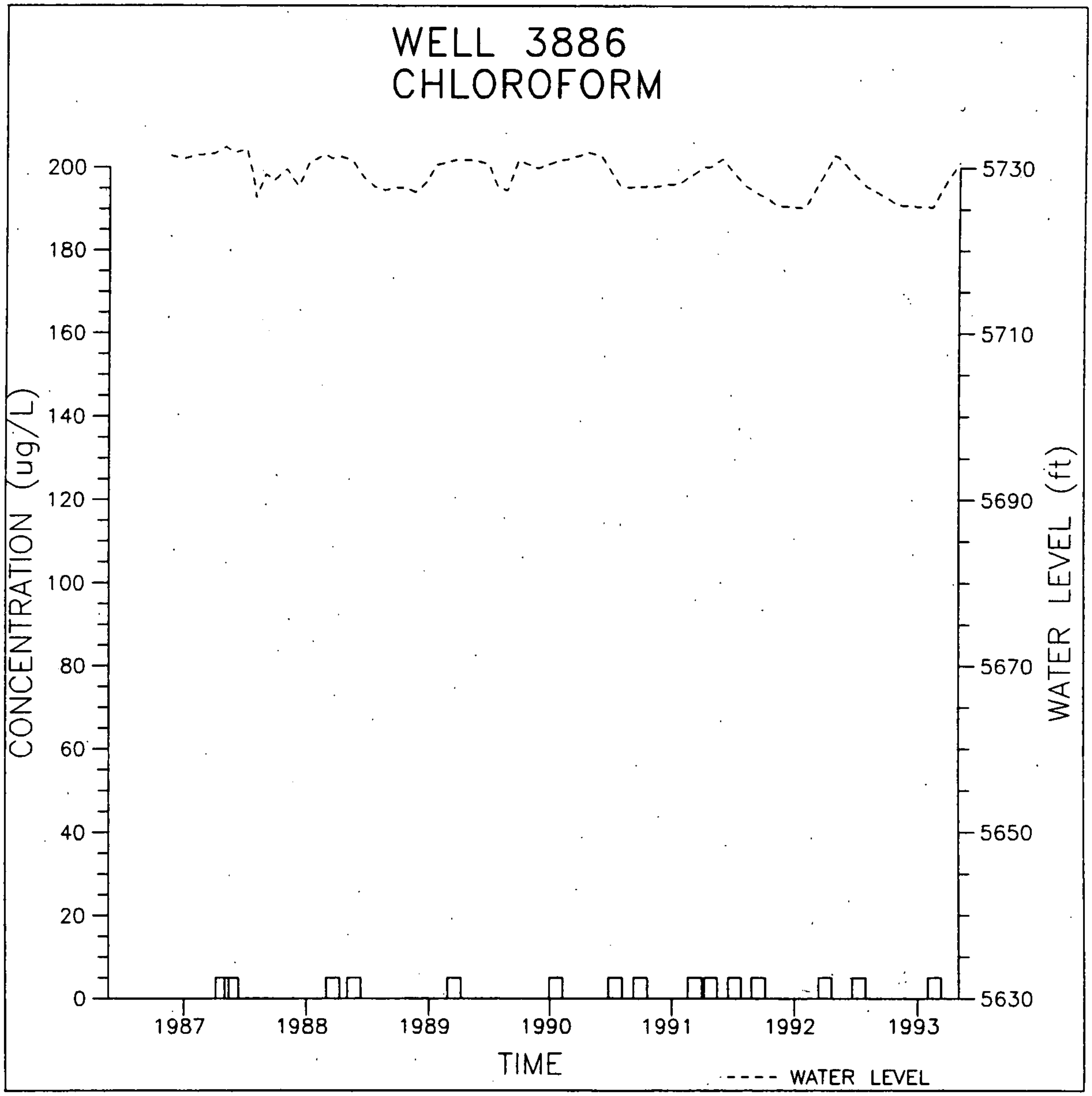
721

258



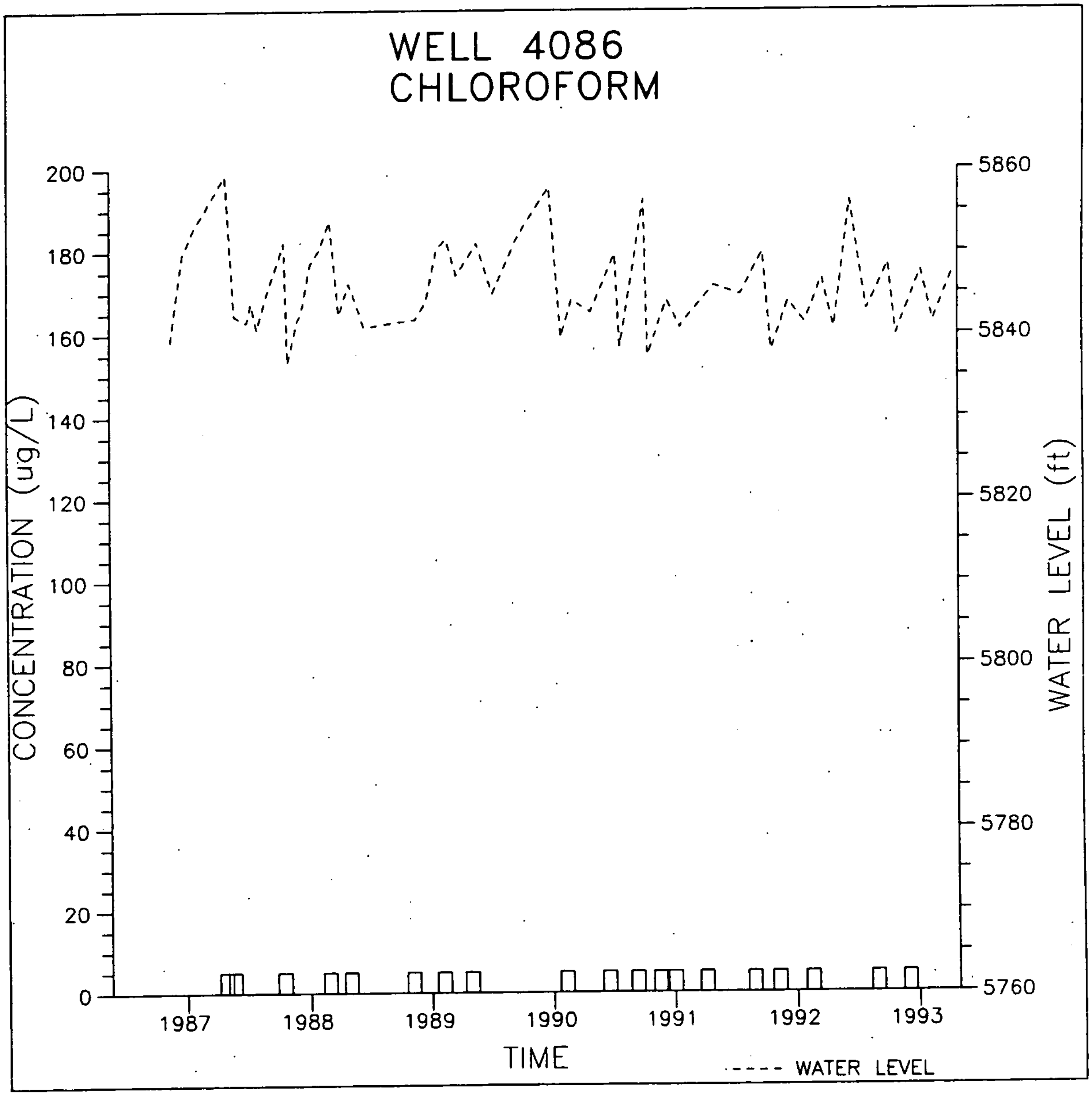
WELL 3486
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993

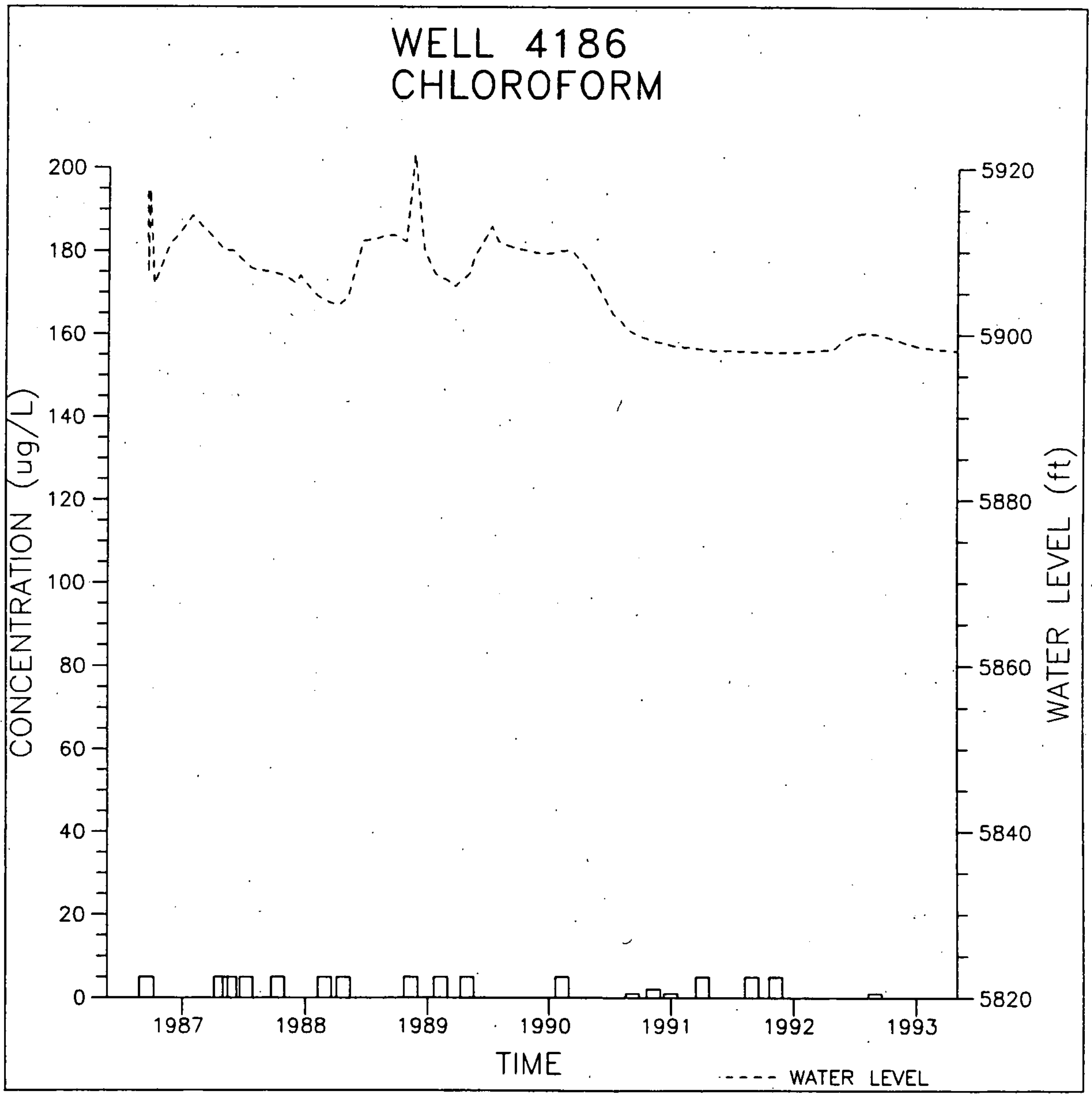
728


WELL 3886
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20
40
60
80
100
120
140
160
180
200
5630
5650
5670
5690
5710
5730
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

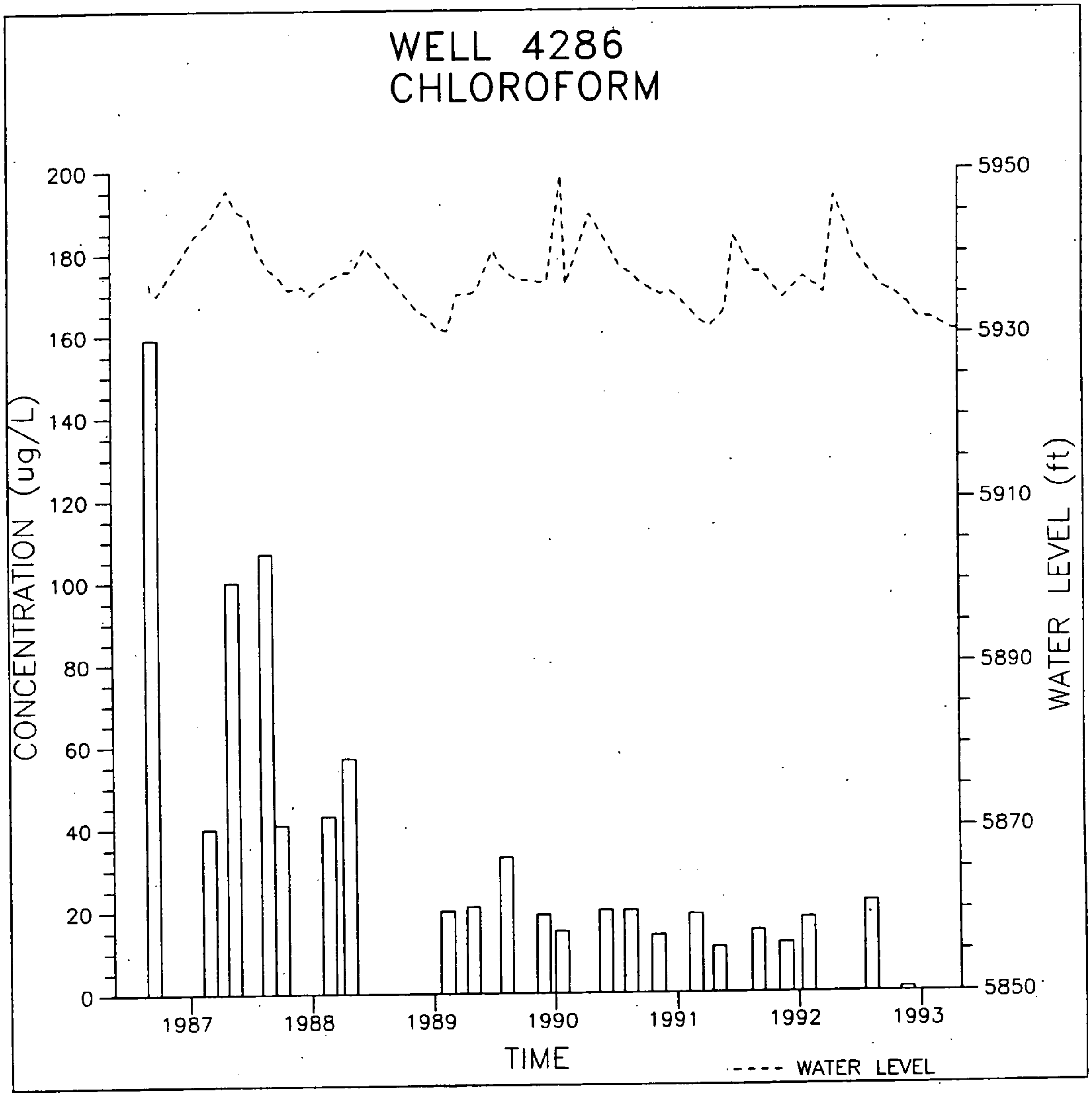
729

230

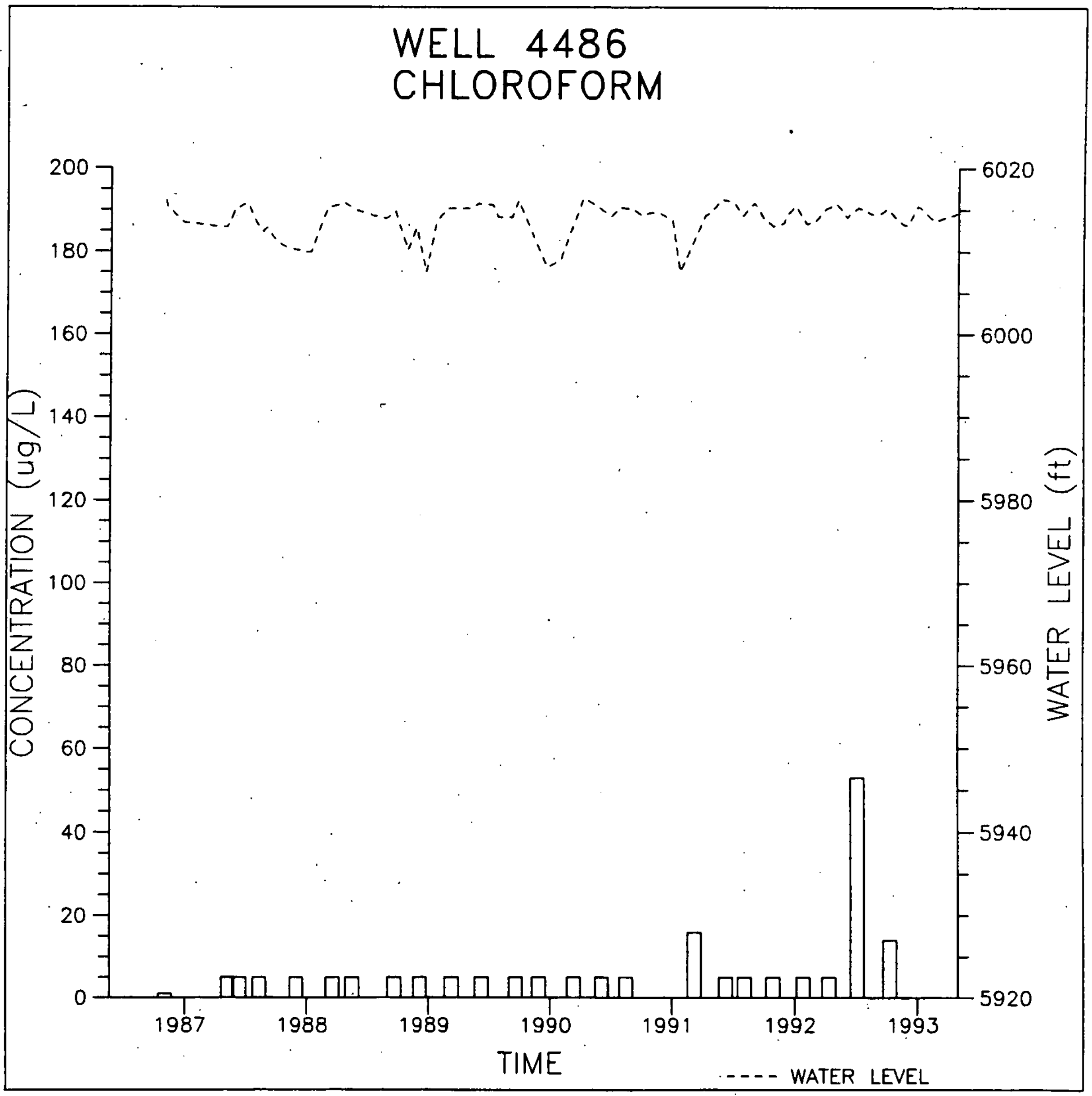

WELL 4086
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL


WELL 4186
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

731

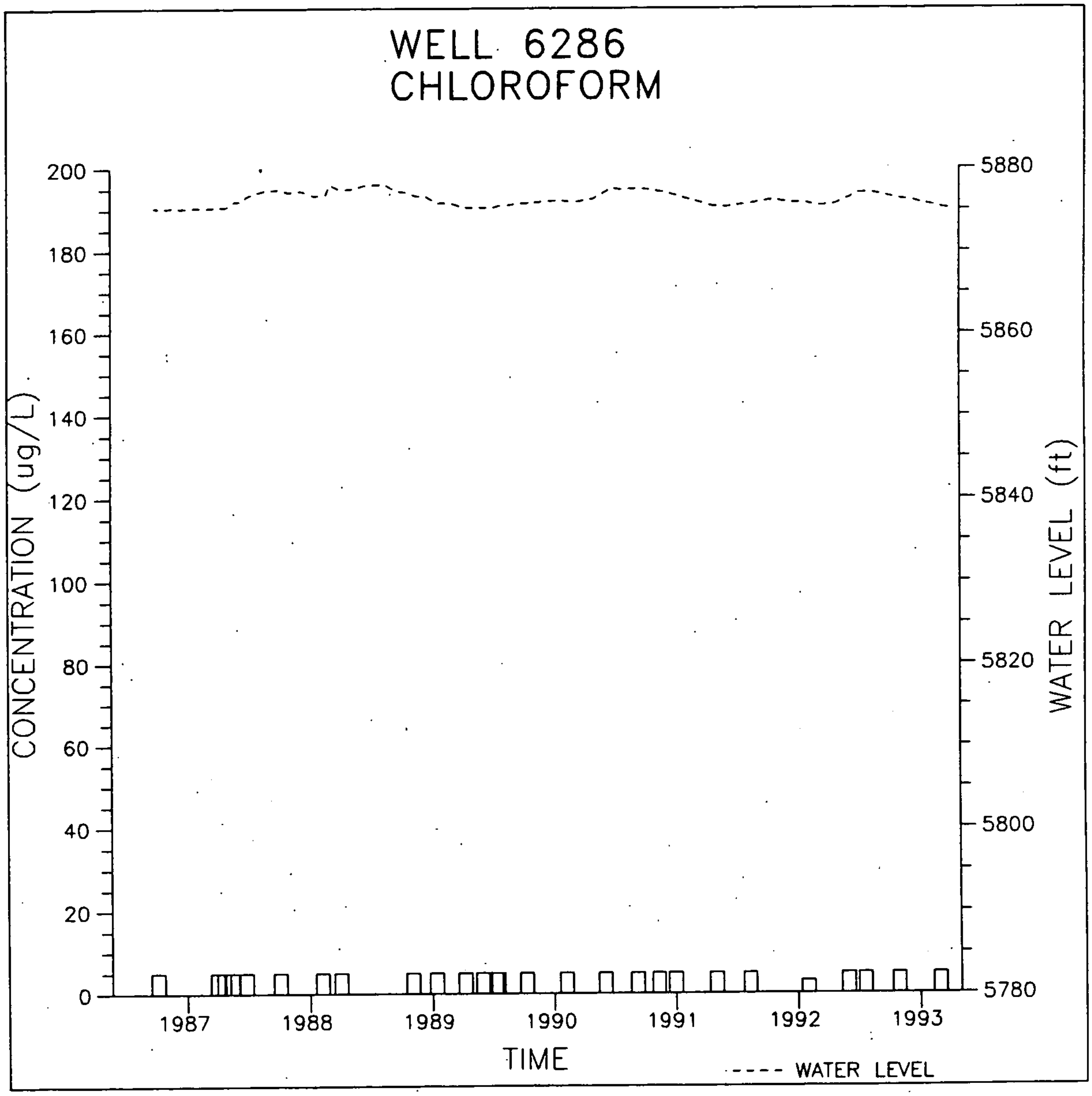

WELL 4286
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5950
5930
5910
5890
5870
5850
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

732

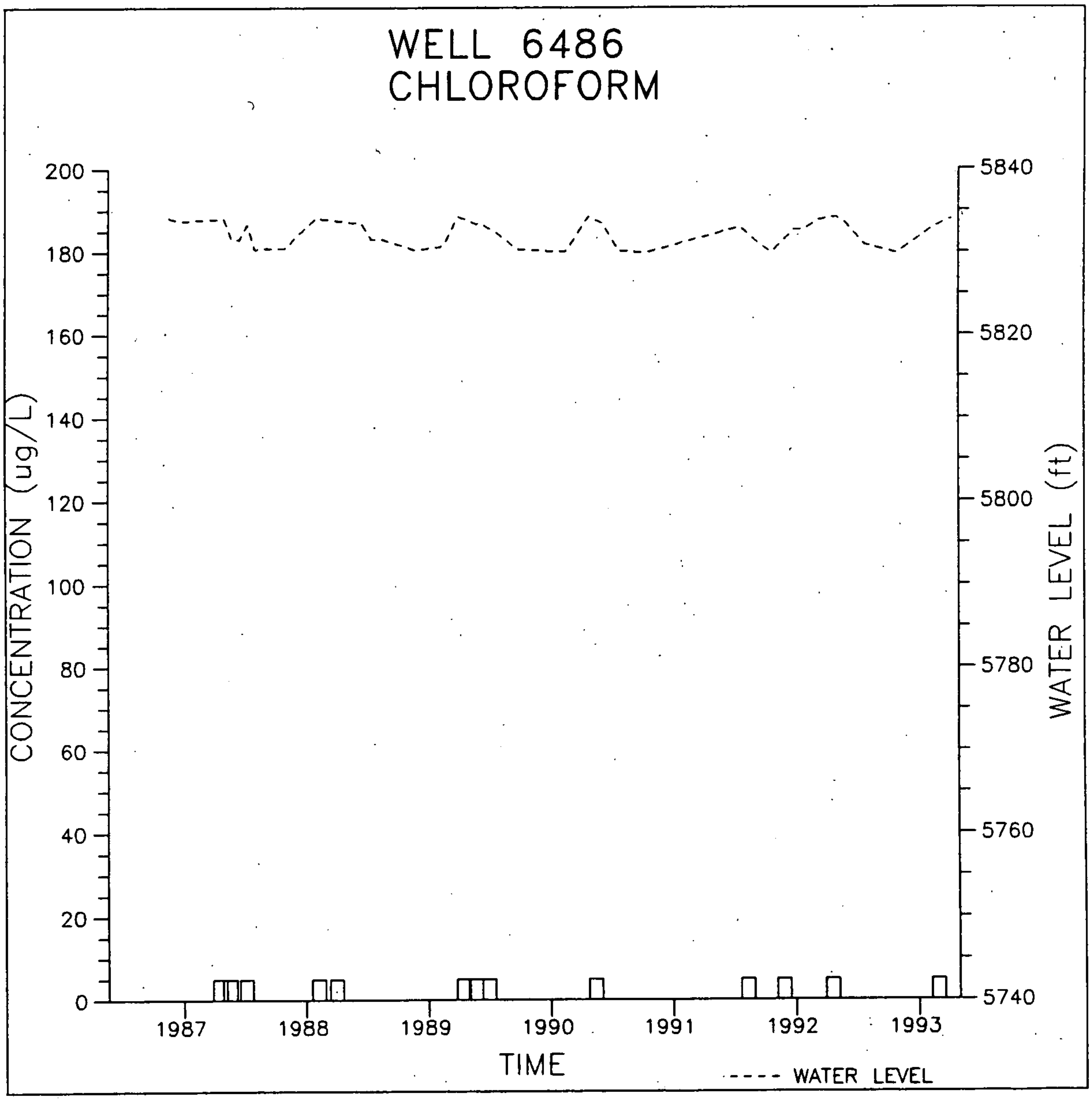

WELL 4486
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

733

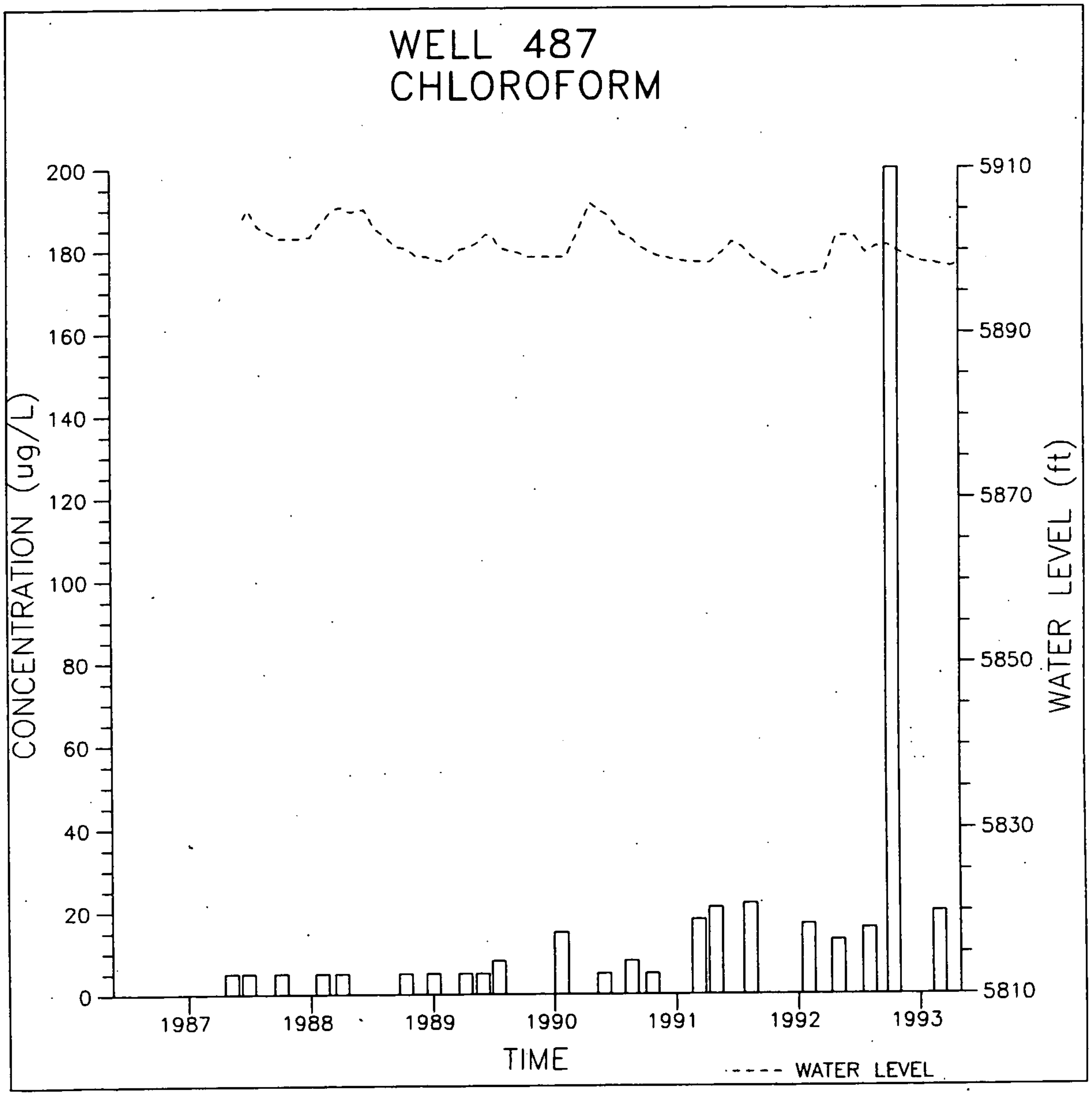
184


WELL 6286
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

734


WELL 6486
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5840
5820
5800
5780
5760
5740
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

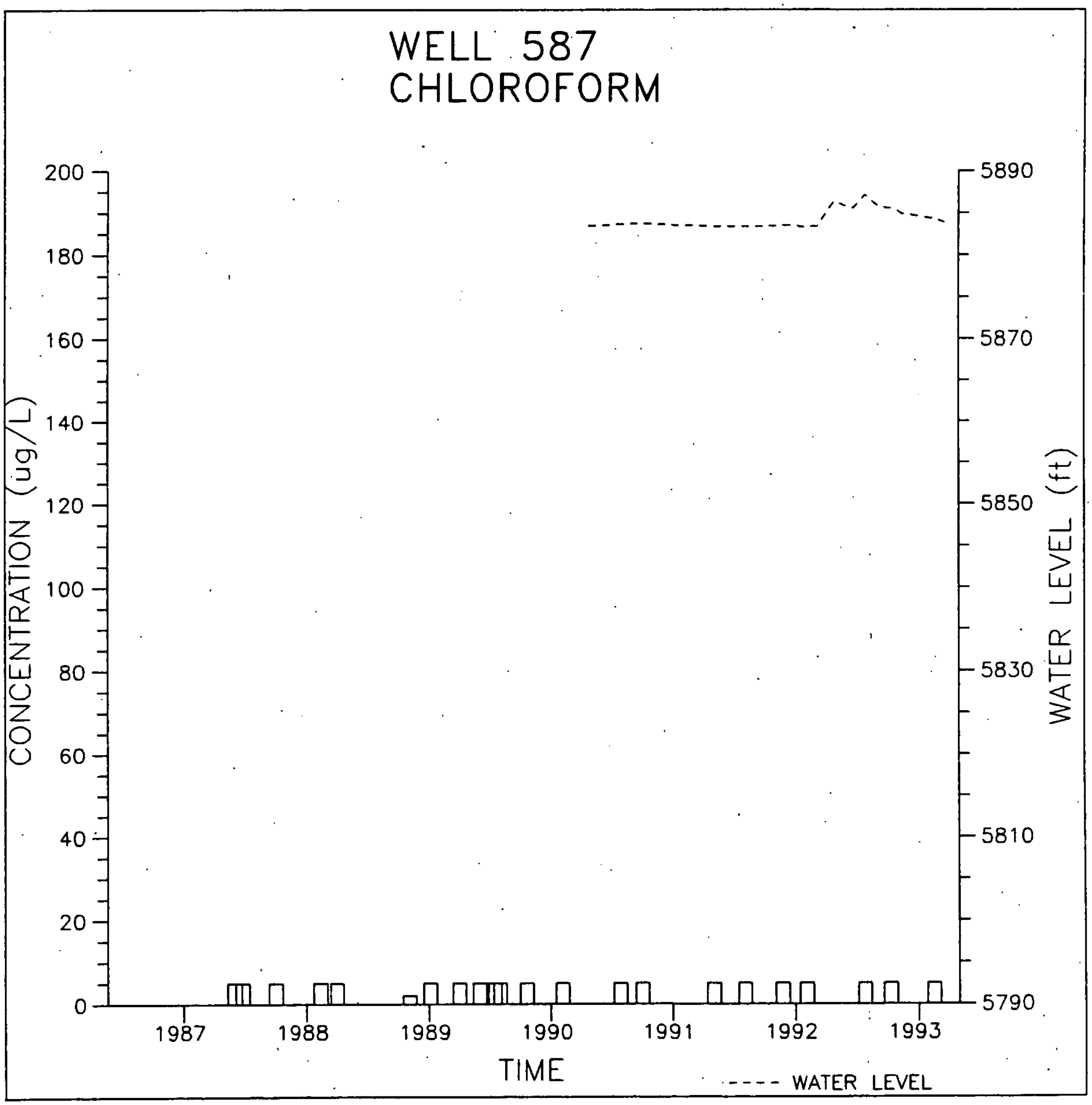
735



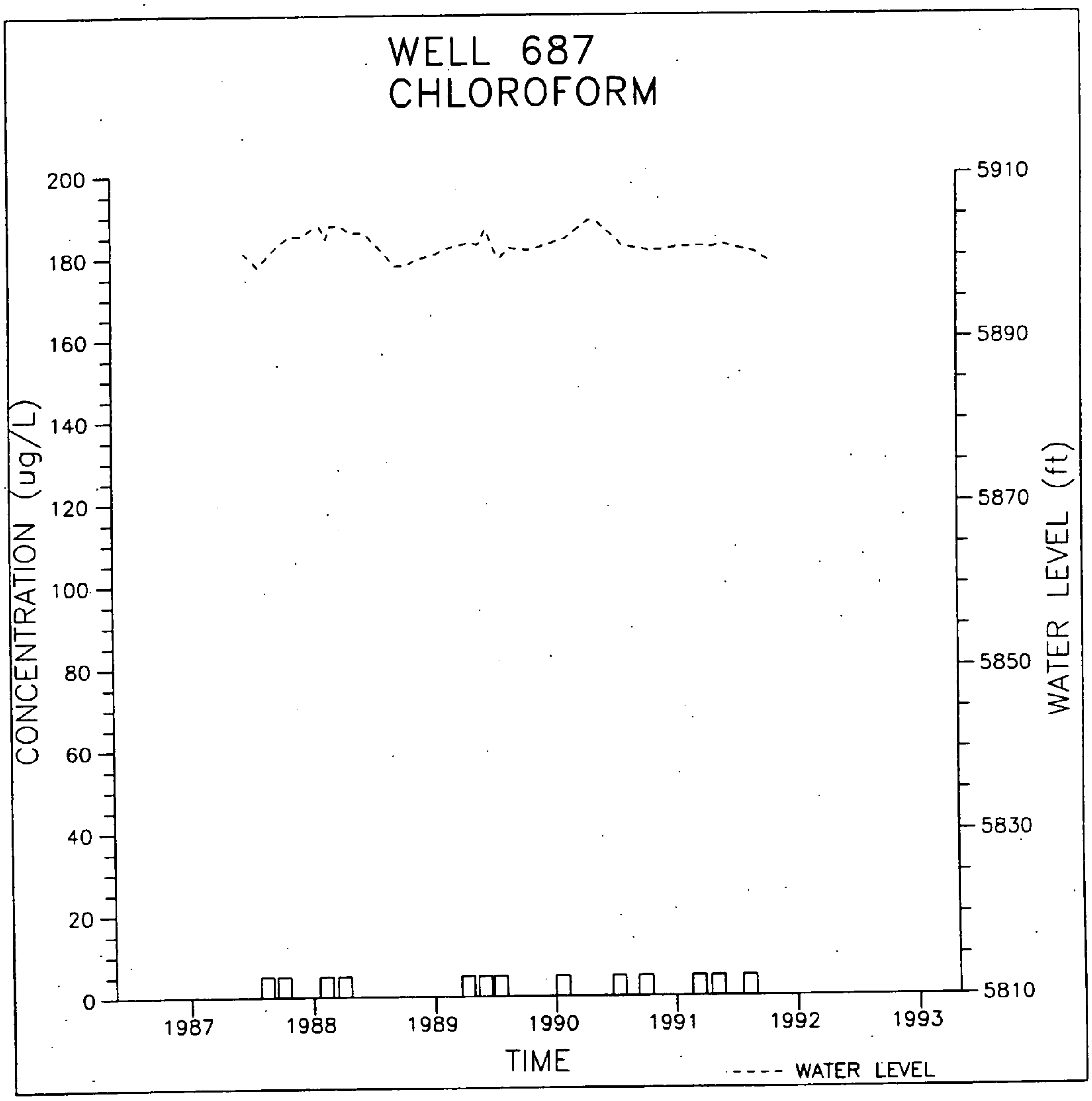
WELL 487
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

736

787

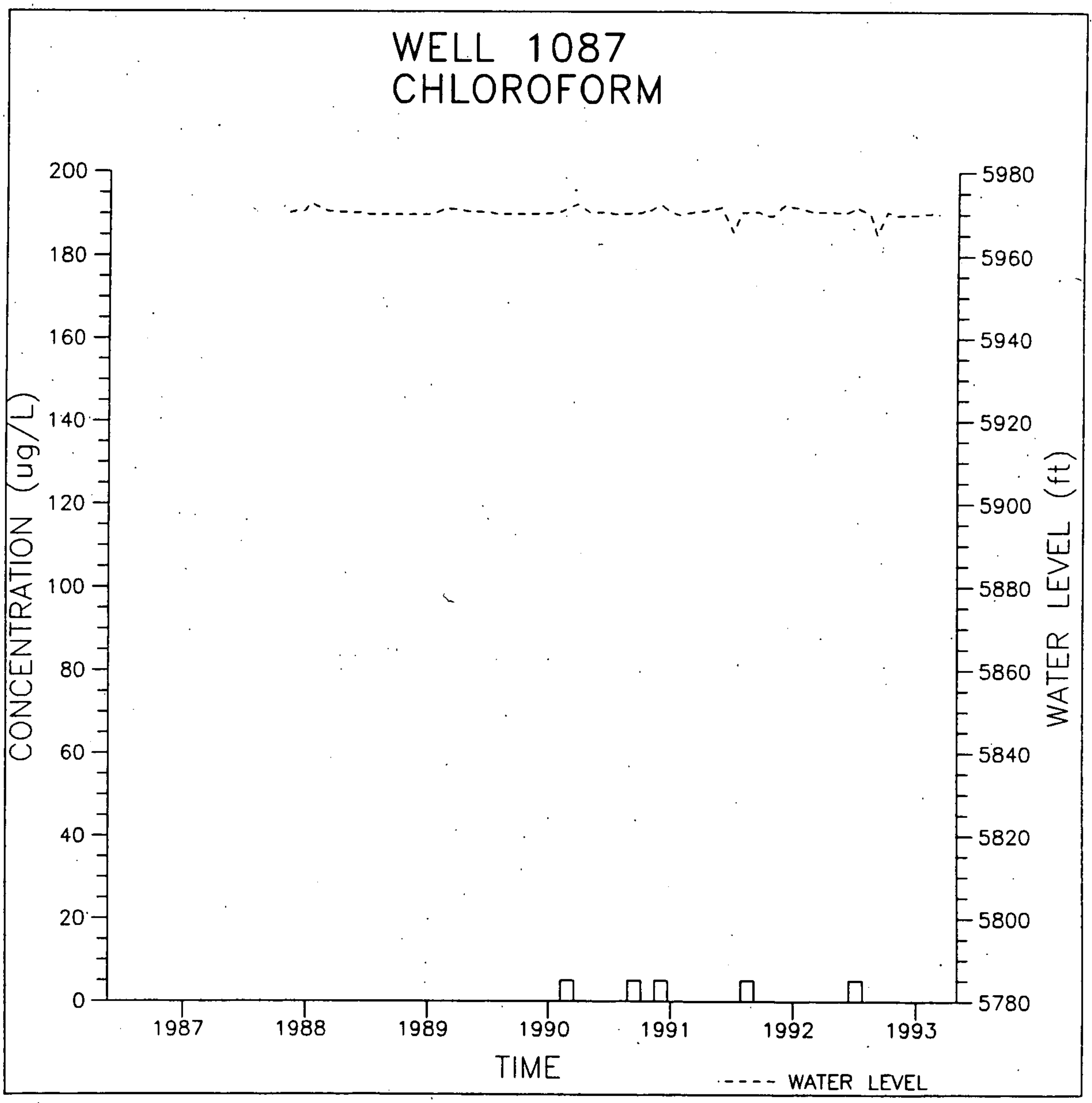

WELL 587
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5890
5870
5850
5830
5810
5790
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

737

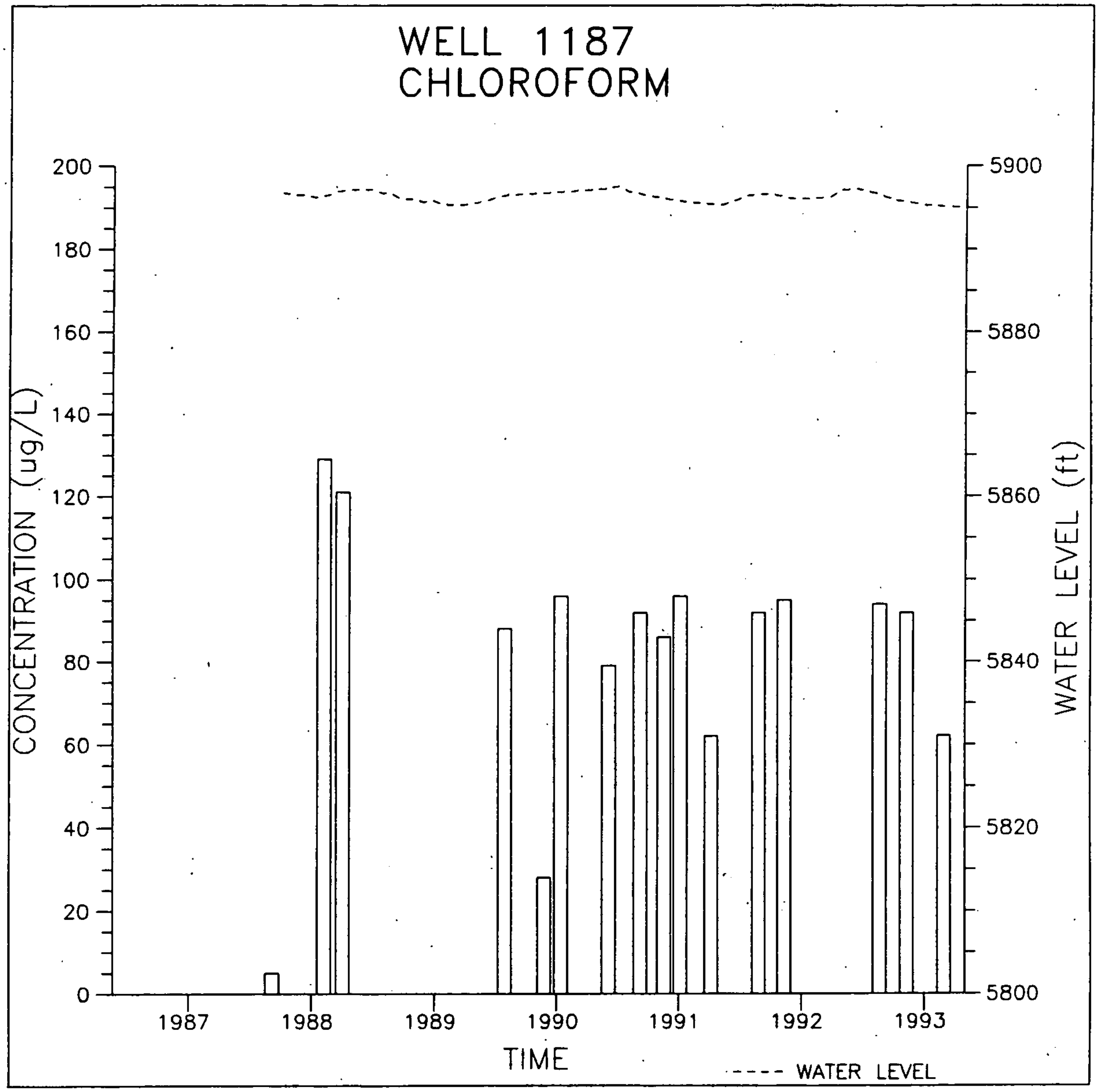


WELL 687
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

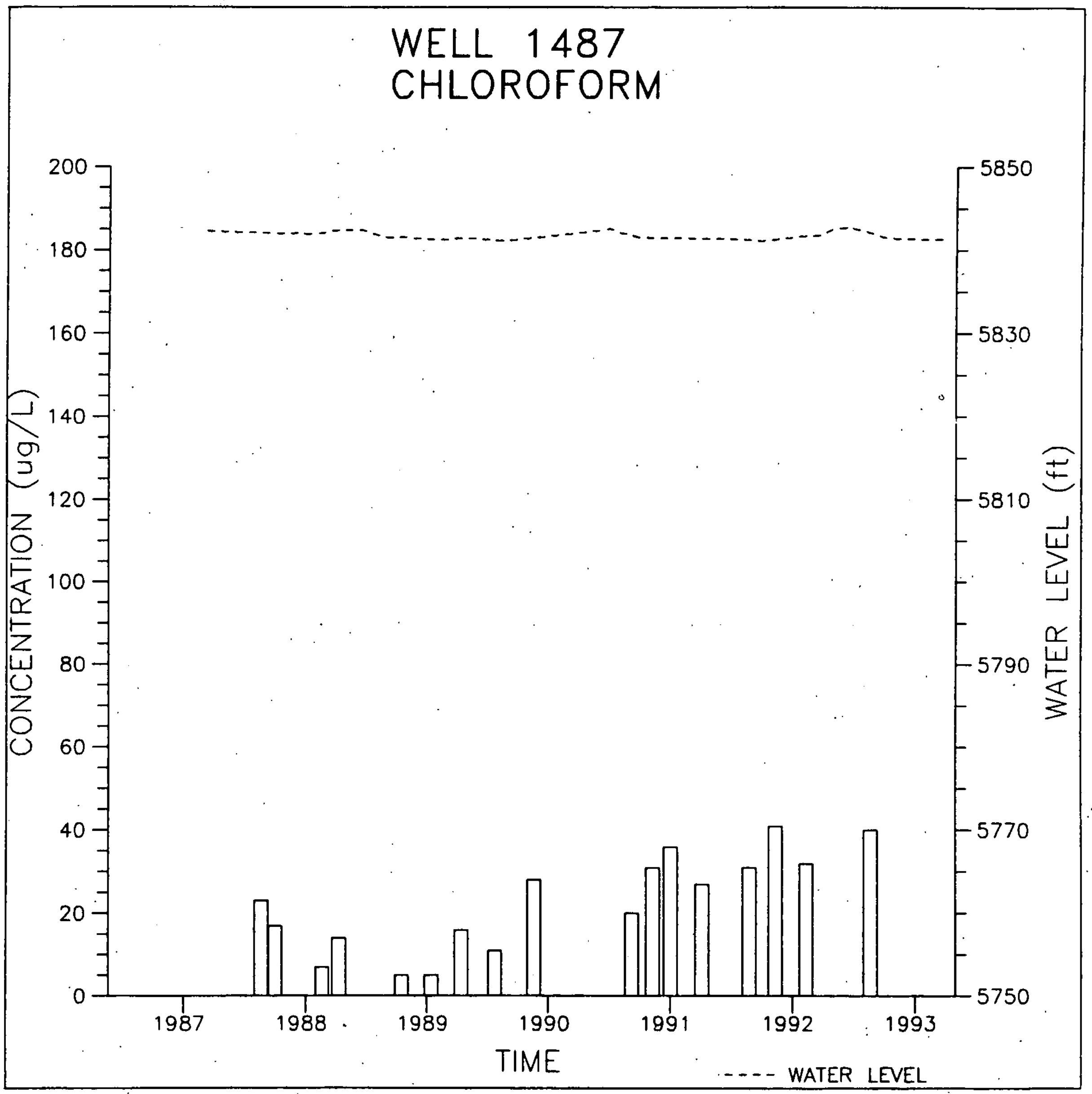
738


WELL 1087
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20
40
60
80
100
120
140
160
180
200
5780
5800
5820
5840
5860
5880
5900
5920
5940
5960
5980
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

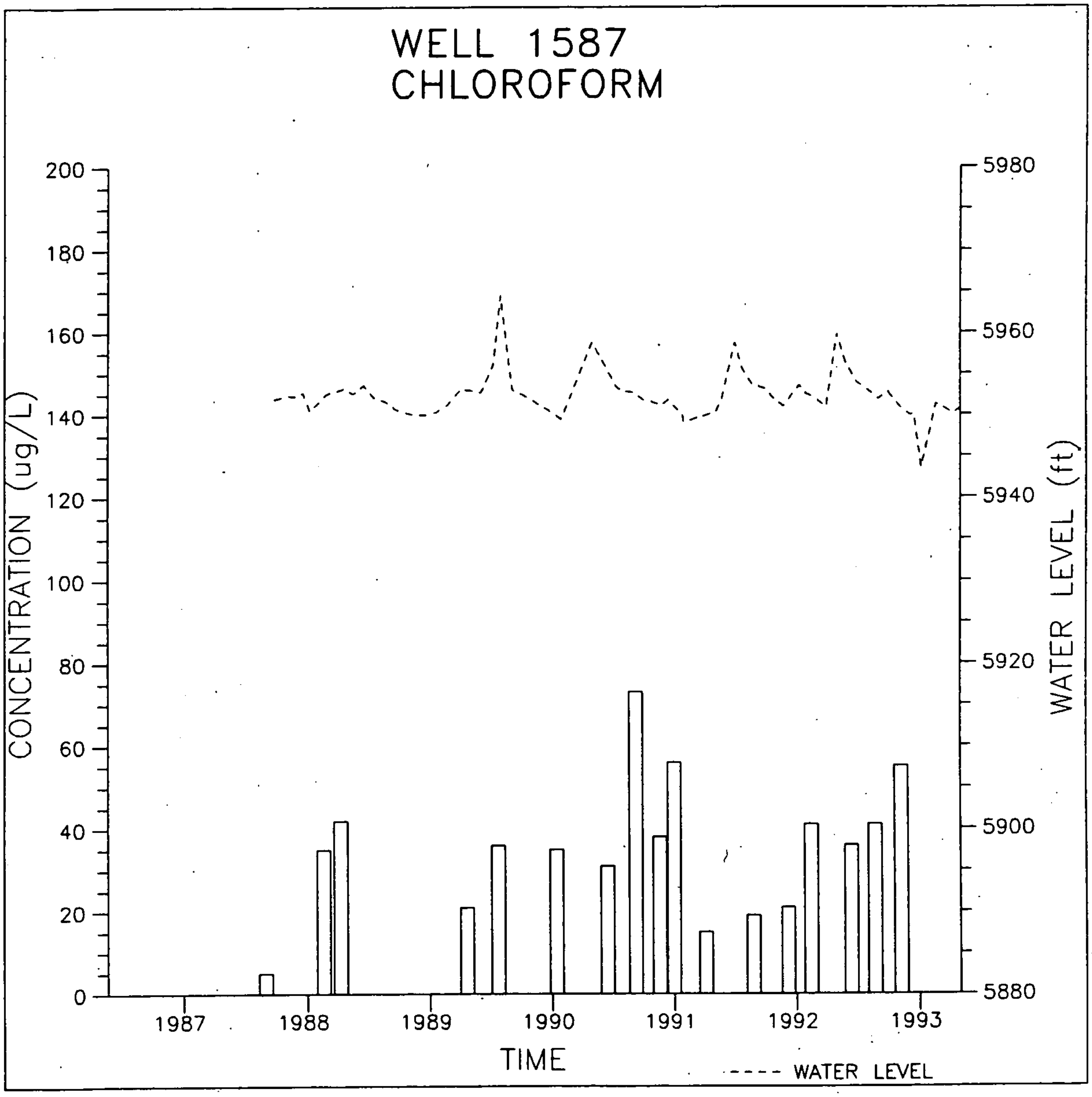
739


WELL 1187
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

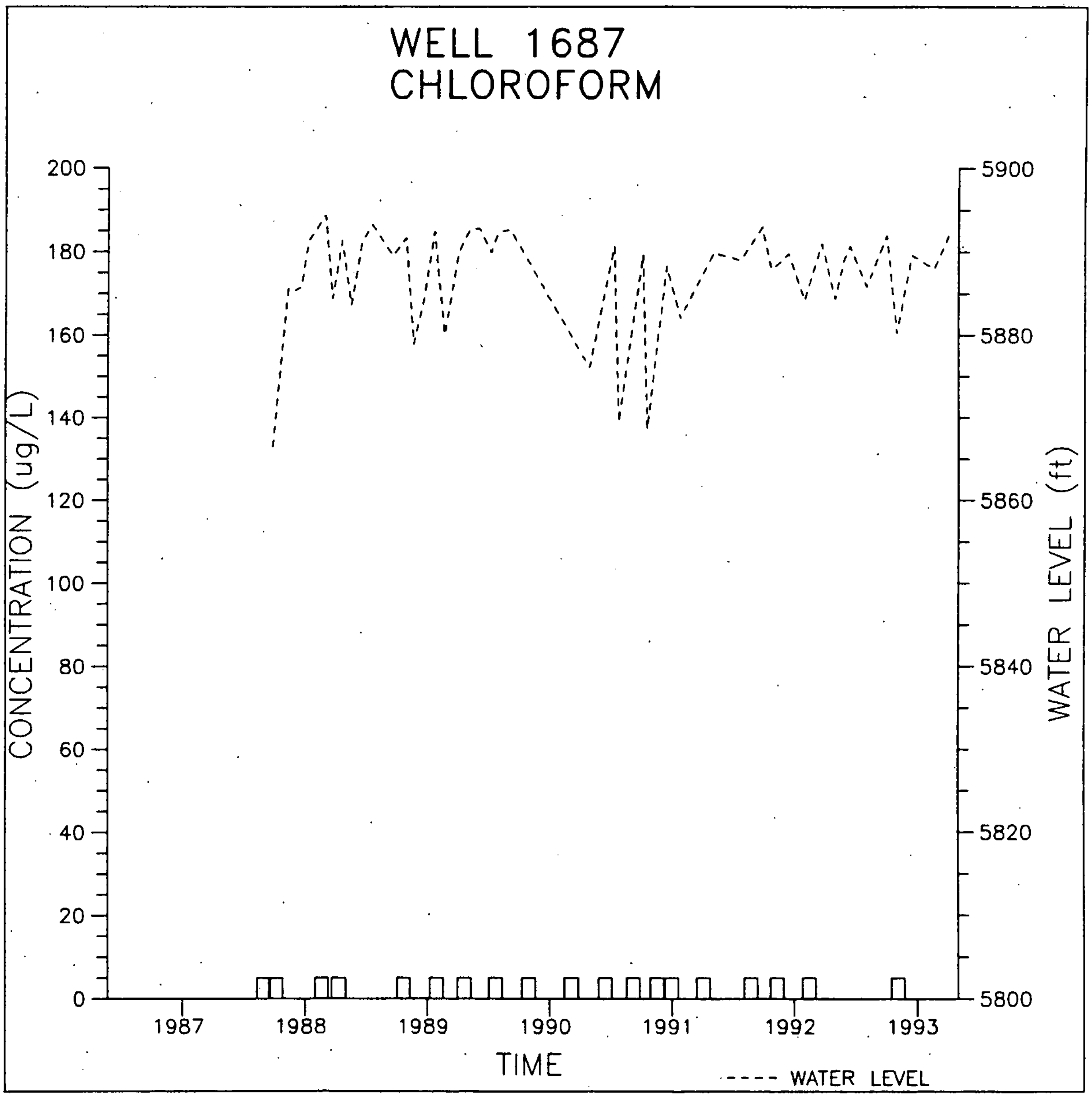
740


WELL 1487
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5850
5830
5810
5790
5770
5750
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

741


WELL 1587
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

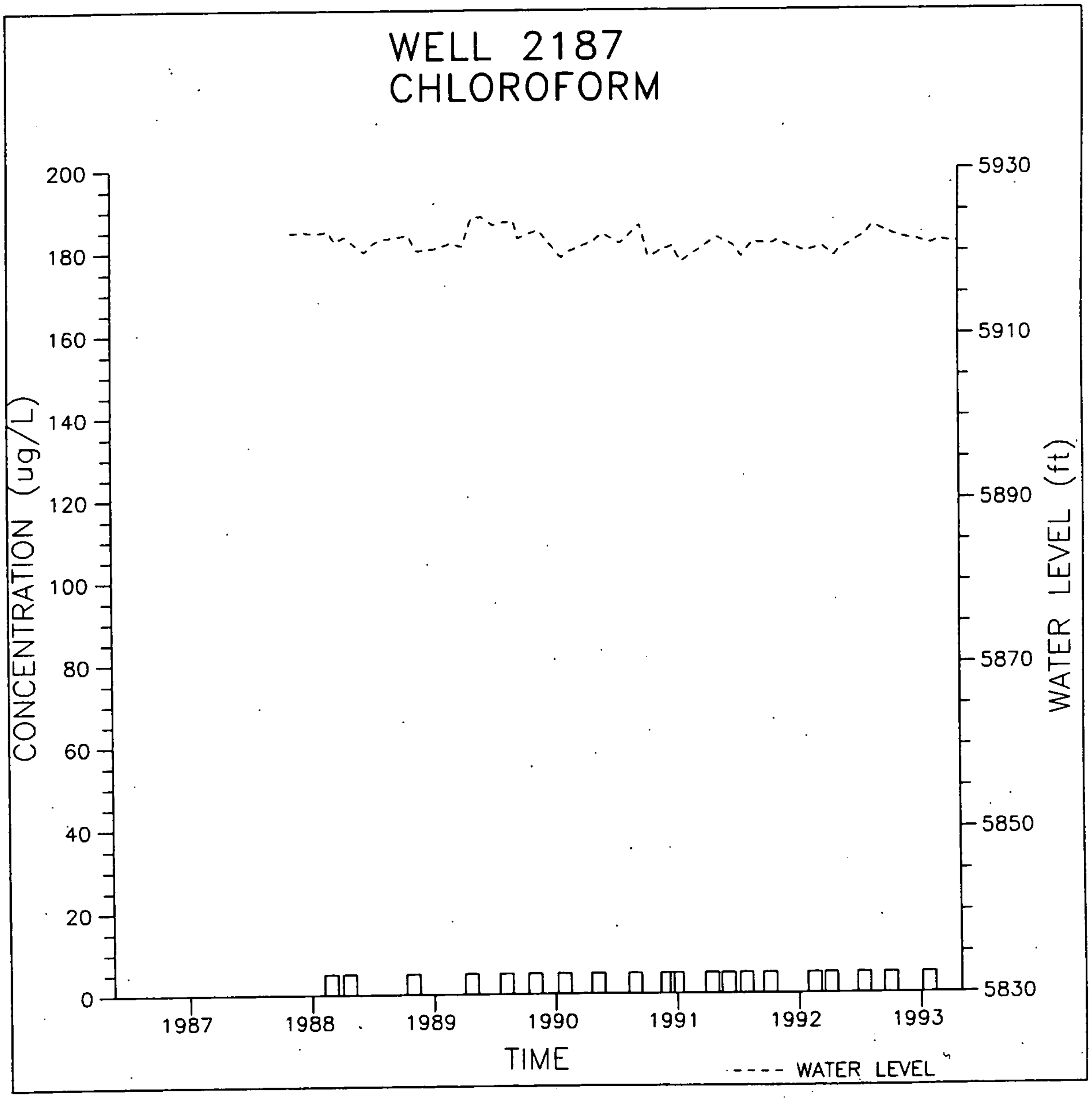
742



WELL 1687
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

743

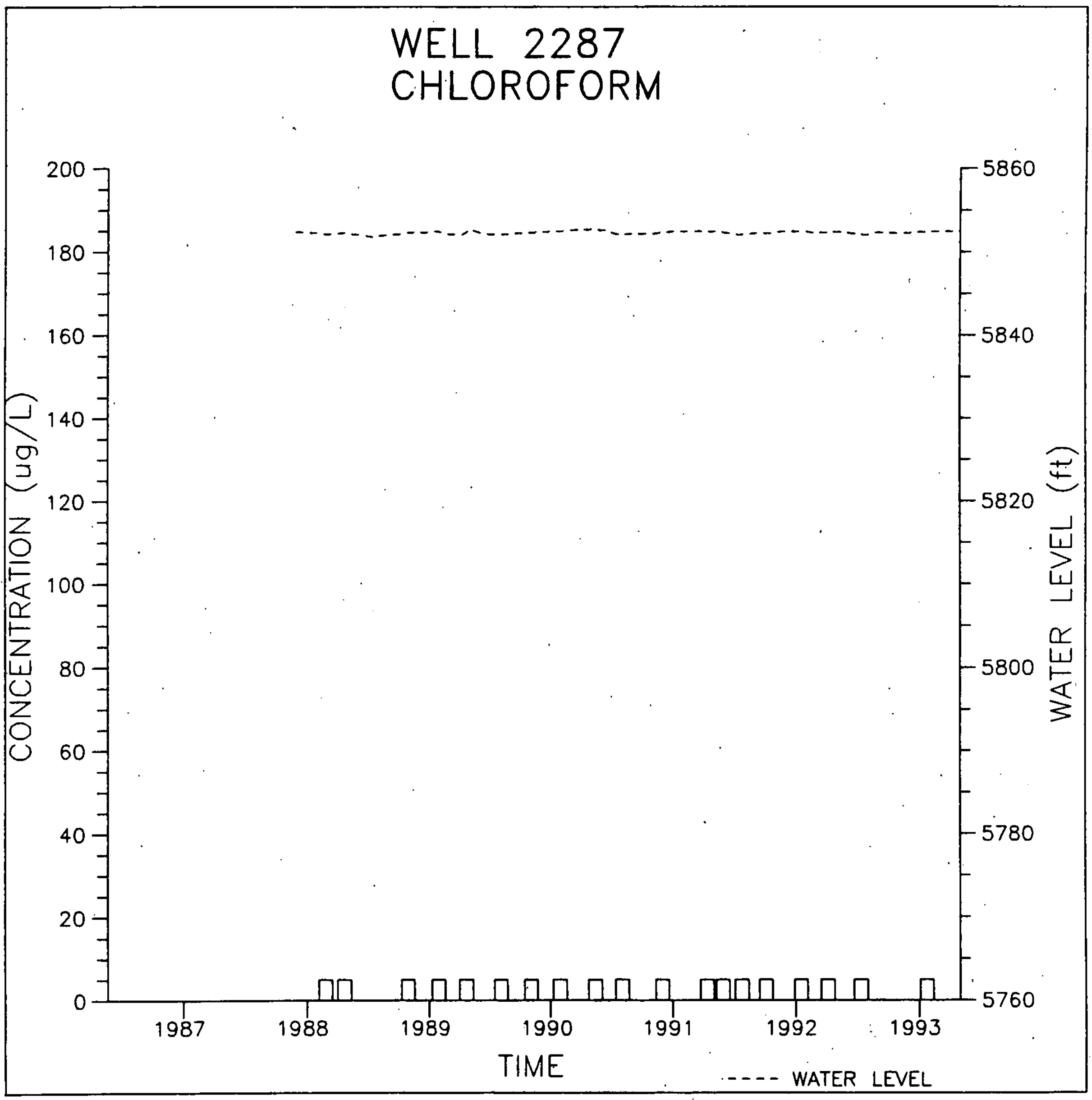
7454



WELL 2187
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

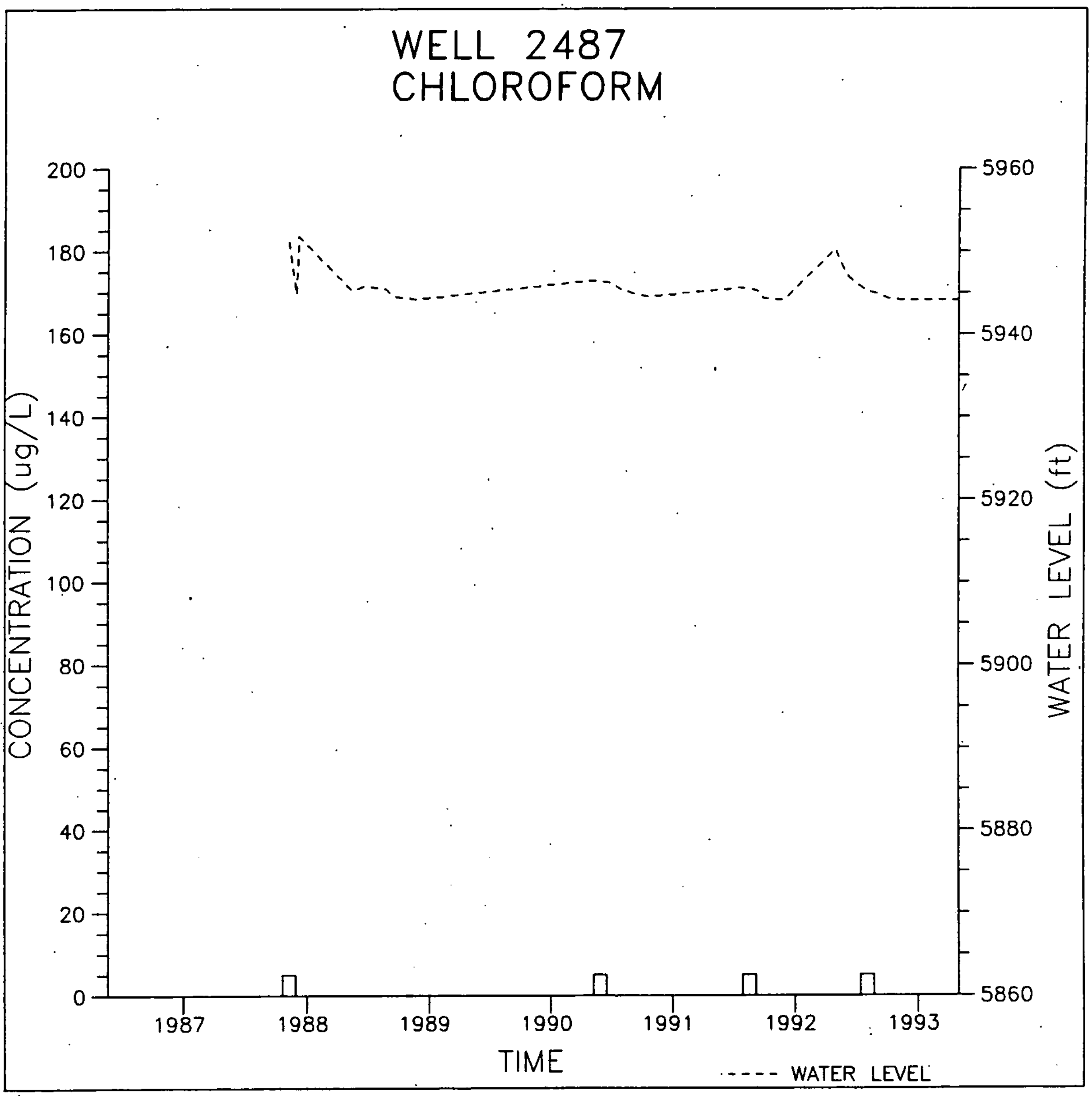
744
743

845


WELL 2287
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5860
5840
5820
5800
5780
5760
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

745

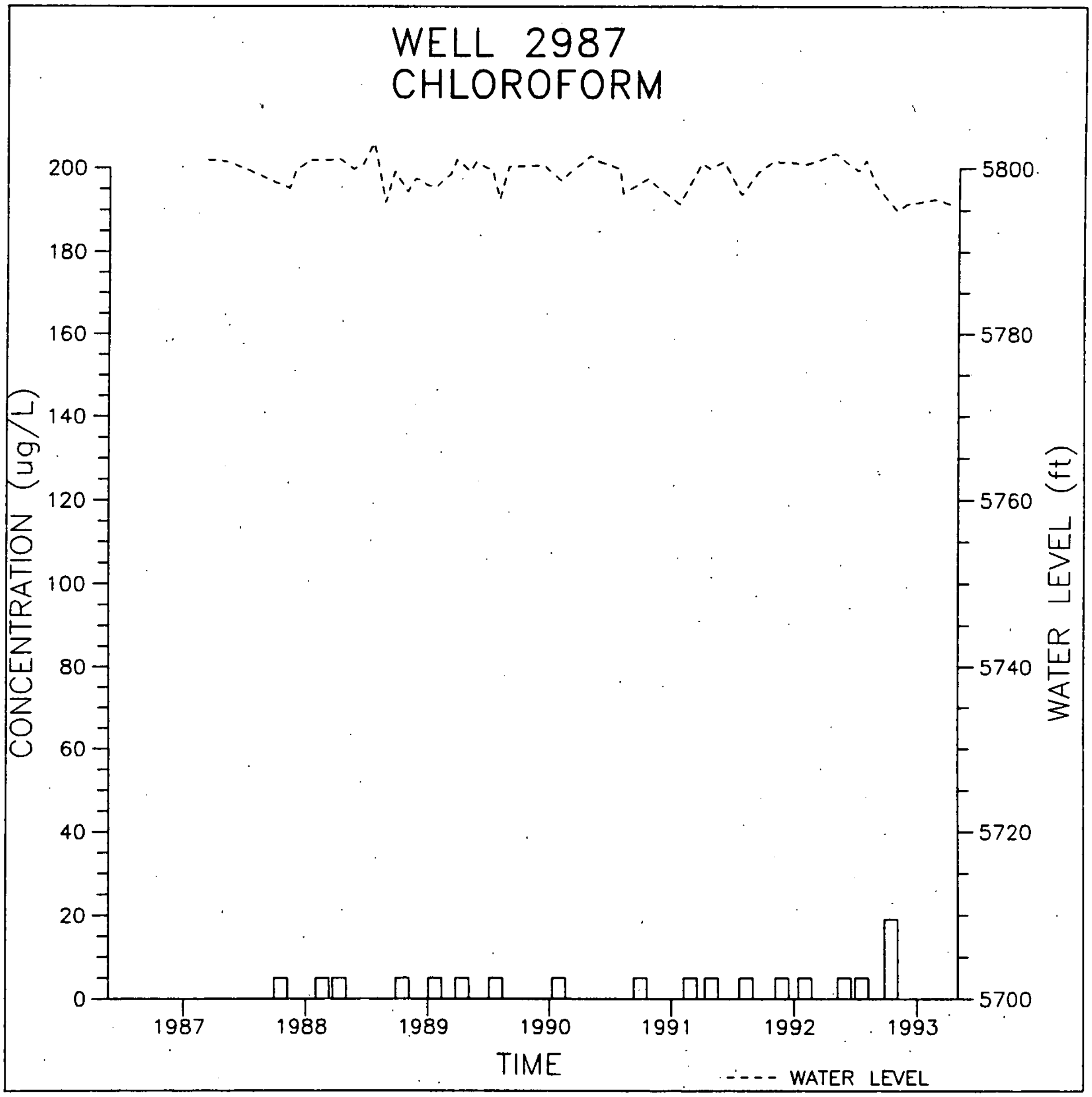
1886



WELL 2487
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

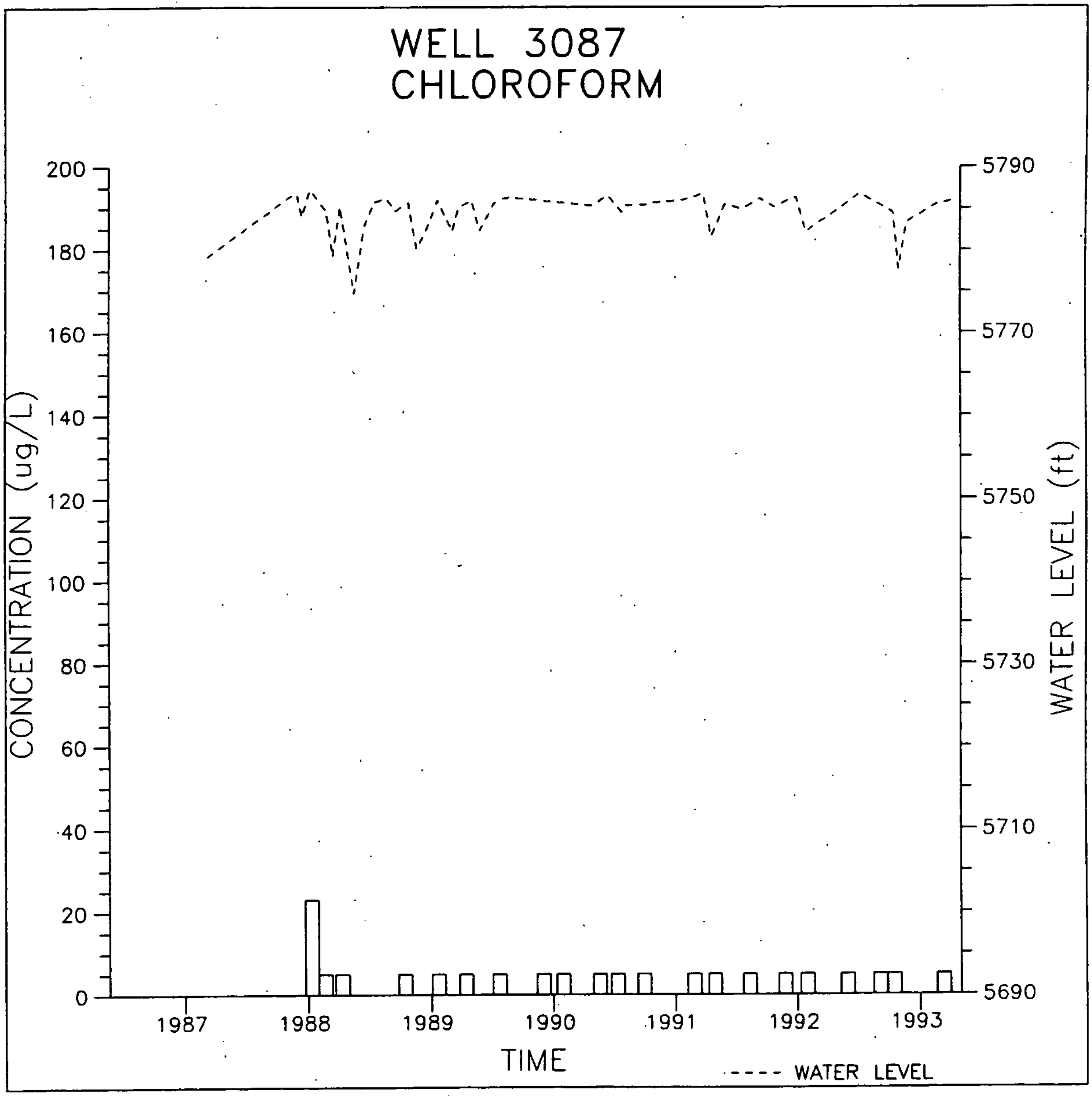
746

284



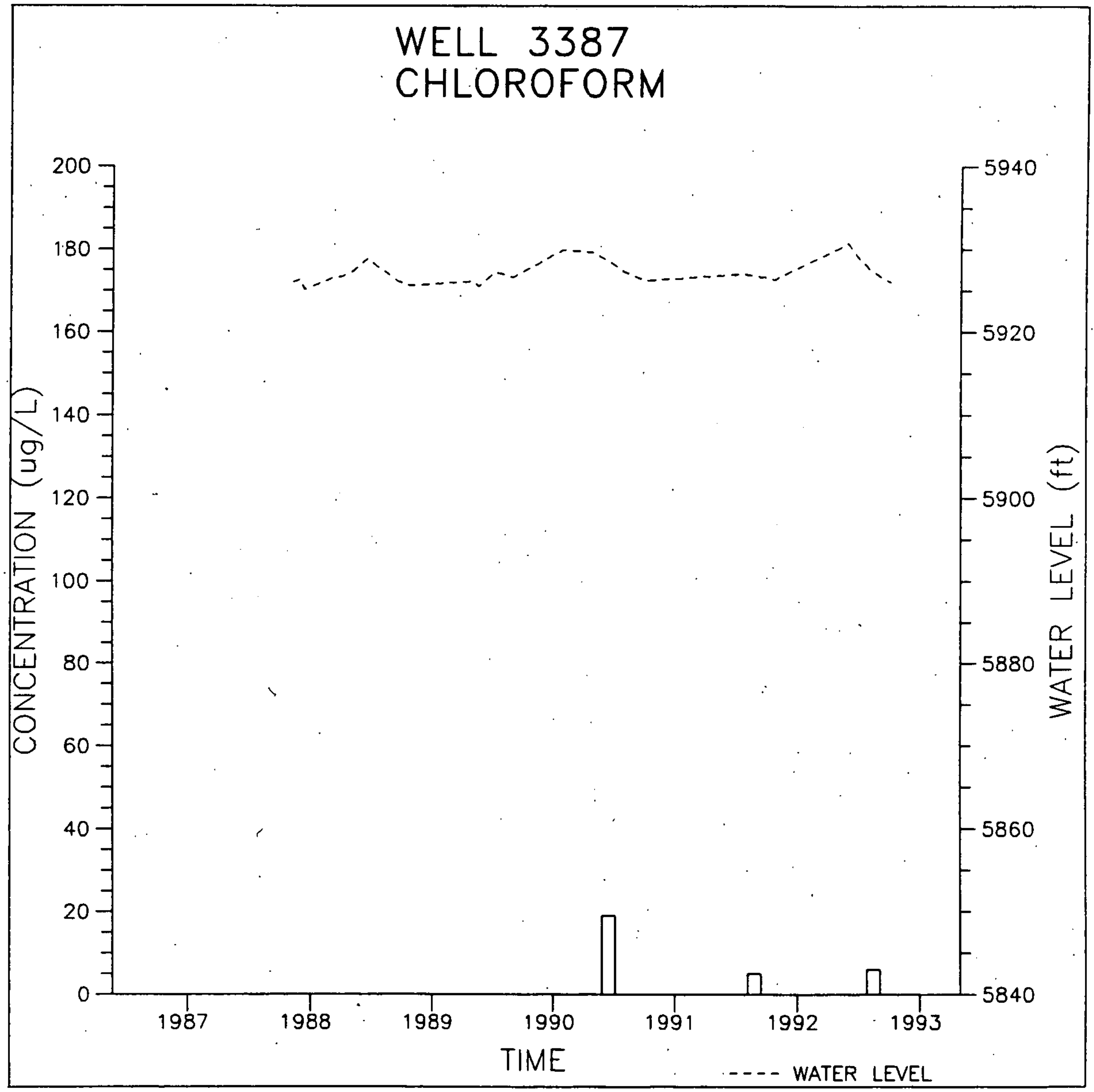
WELL 2987
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5800
5780
5760
5740
5720
5700
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

747



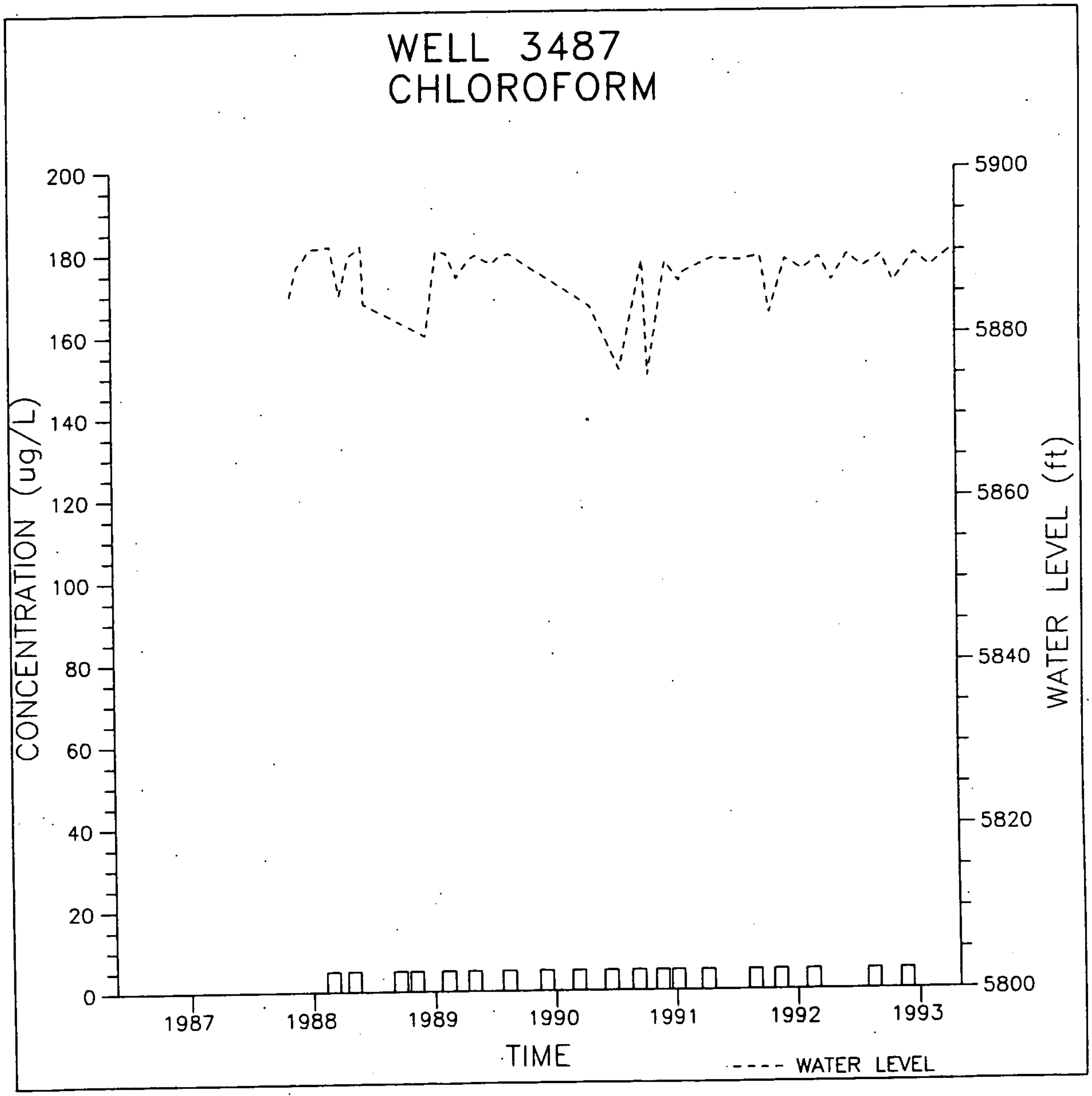
WELL 3087
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5790
5770
5750
5730
5710
5690
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

748



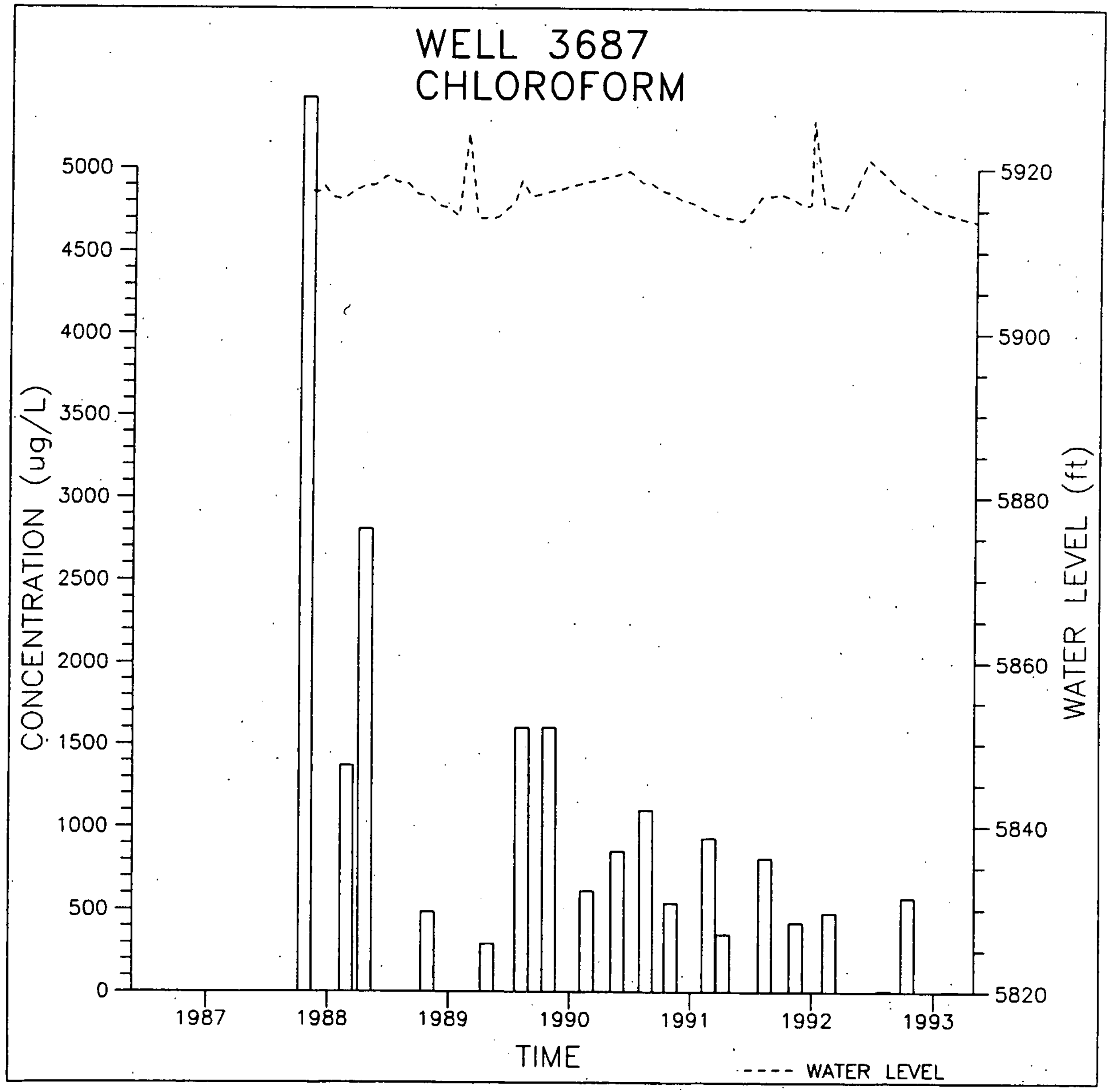
WELL 3387
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

749

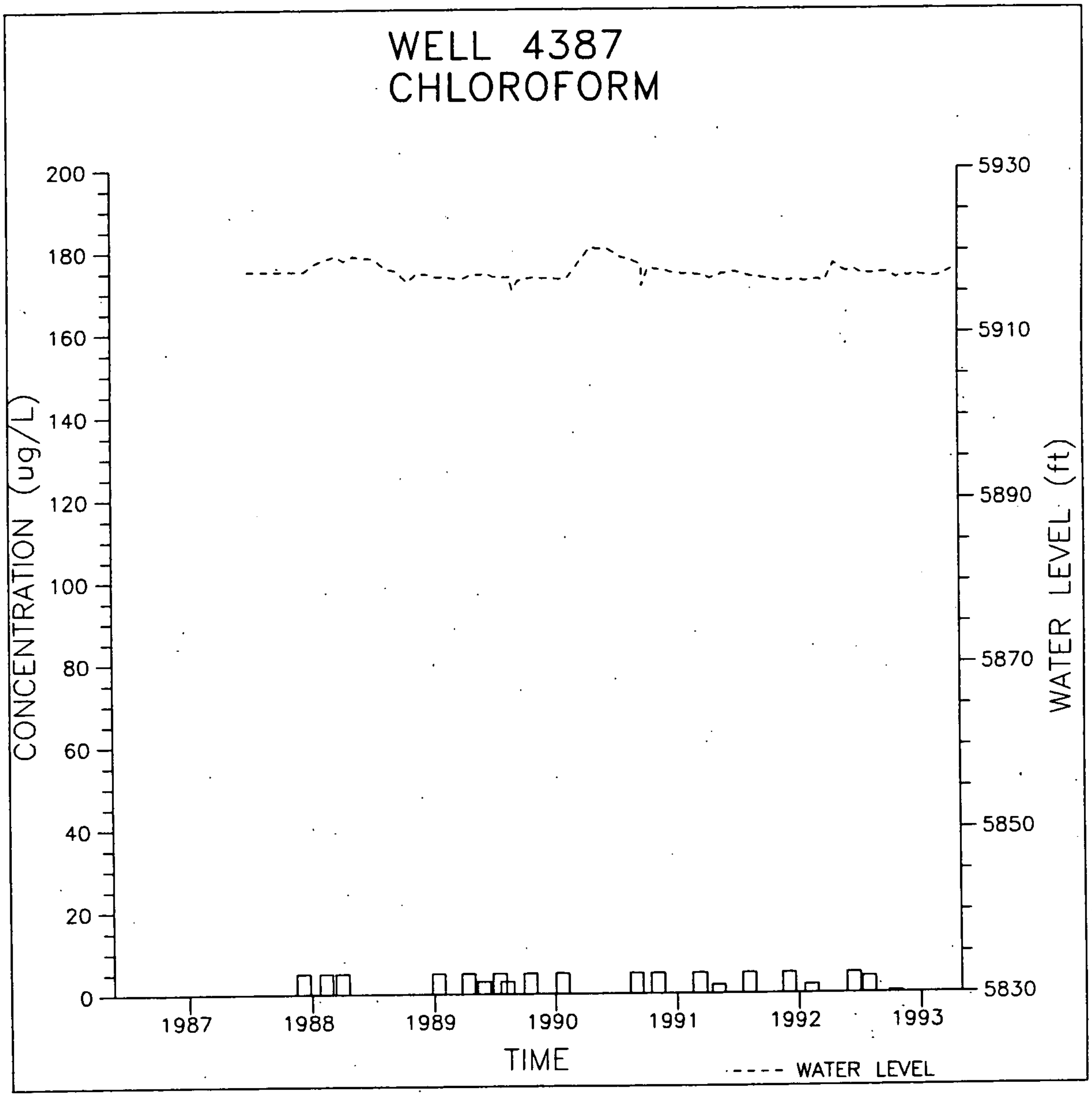

WELL 3487
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

750

15T

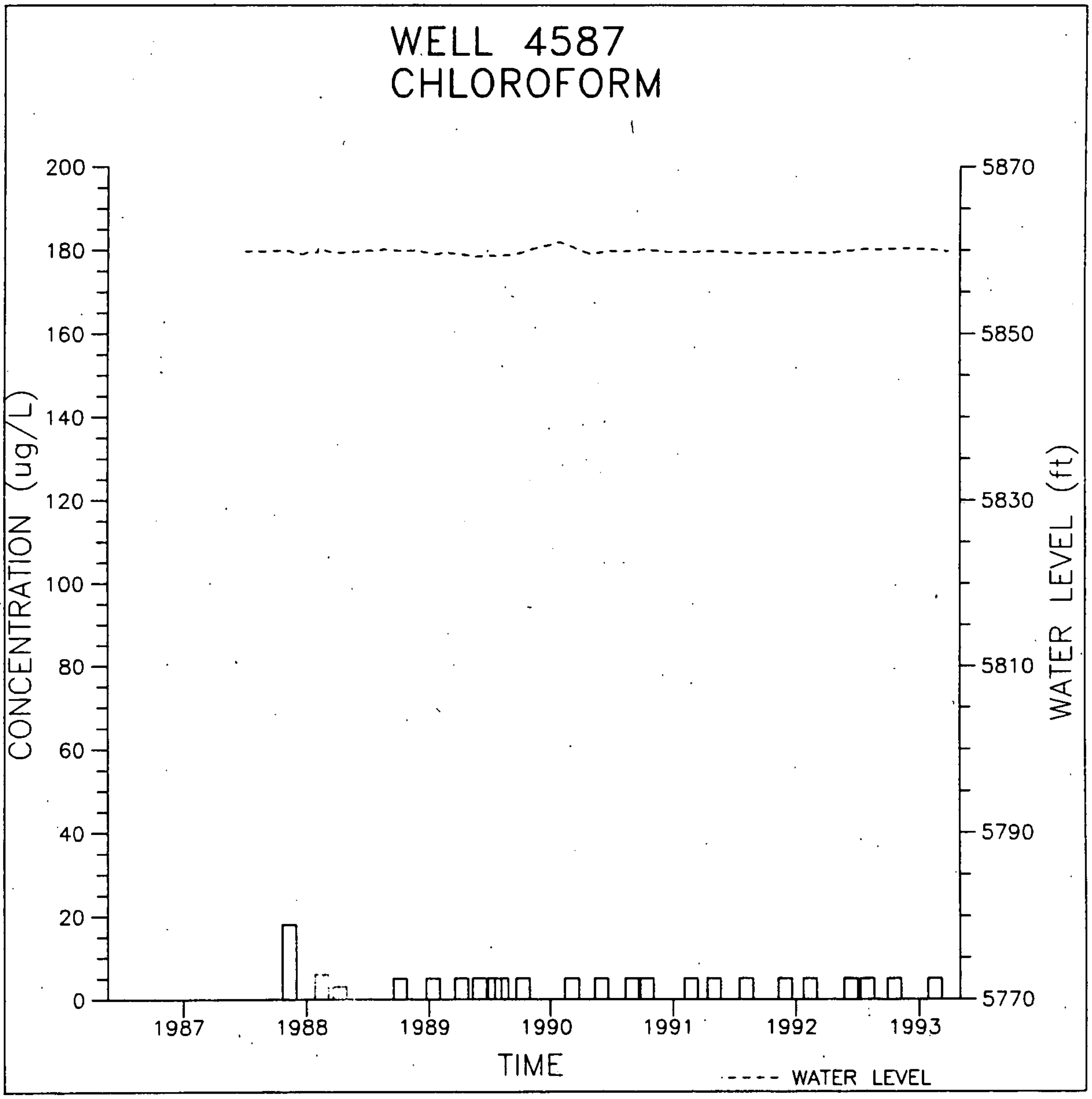

WELL 3687
CHLOROFORM
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

751



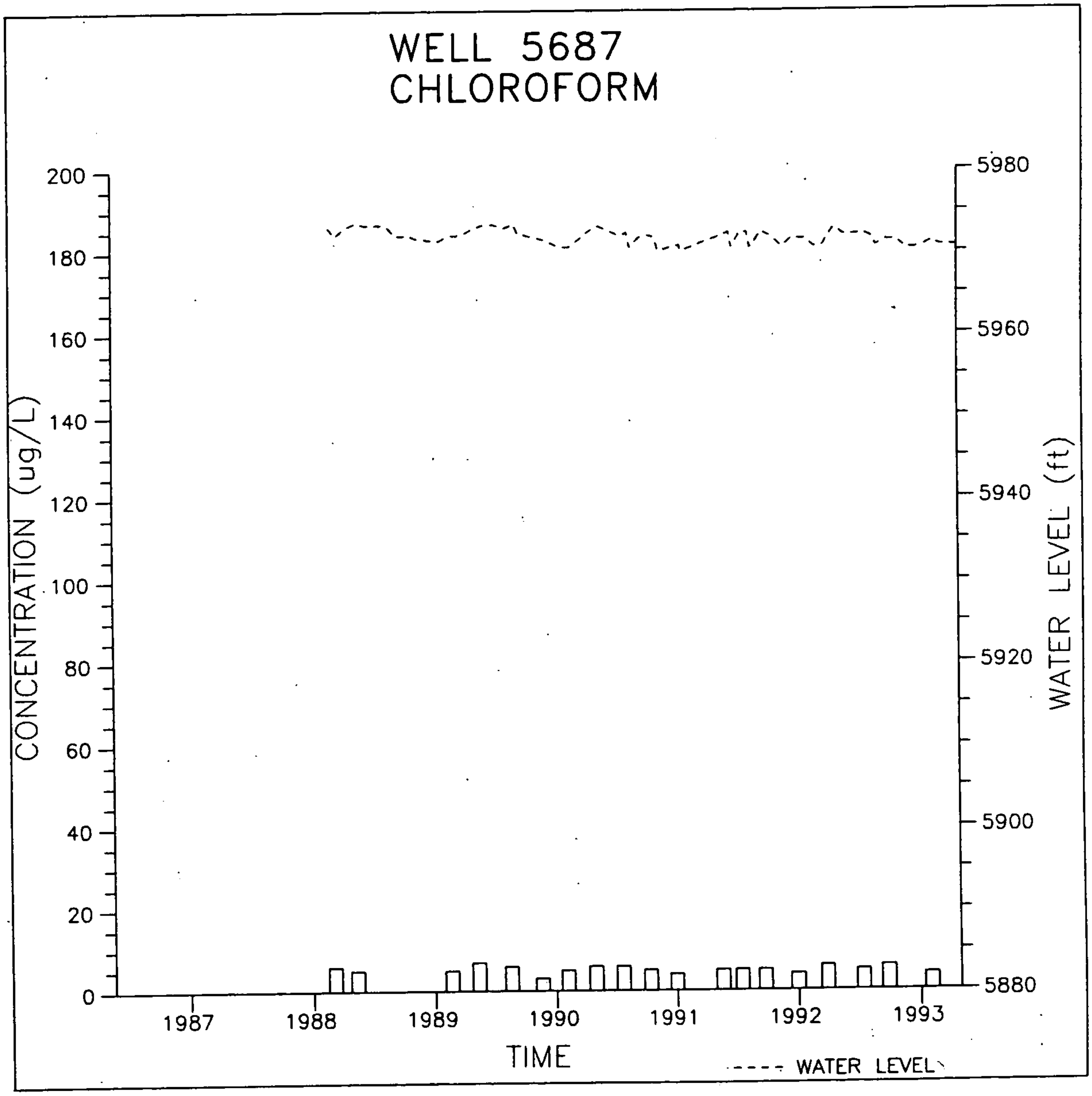
WELL 4387
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

752


WELL 4587
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5870
5850
5830
5810
5790
5770
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

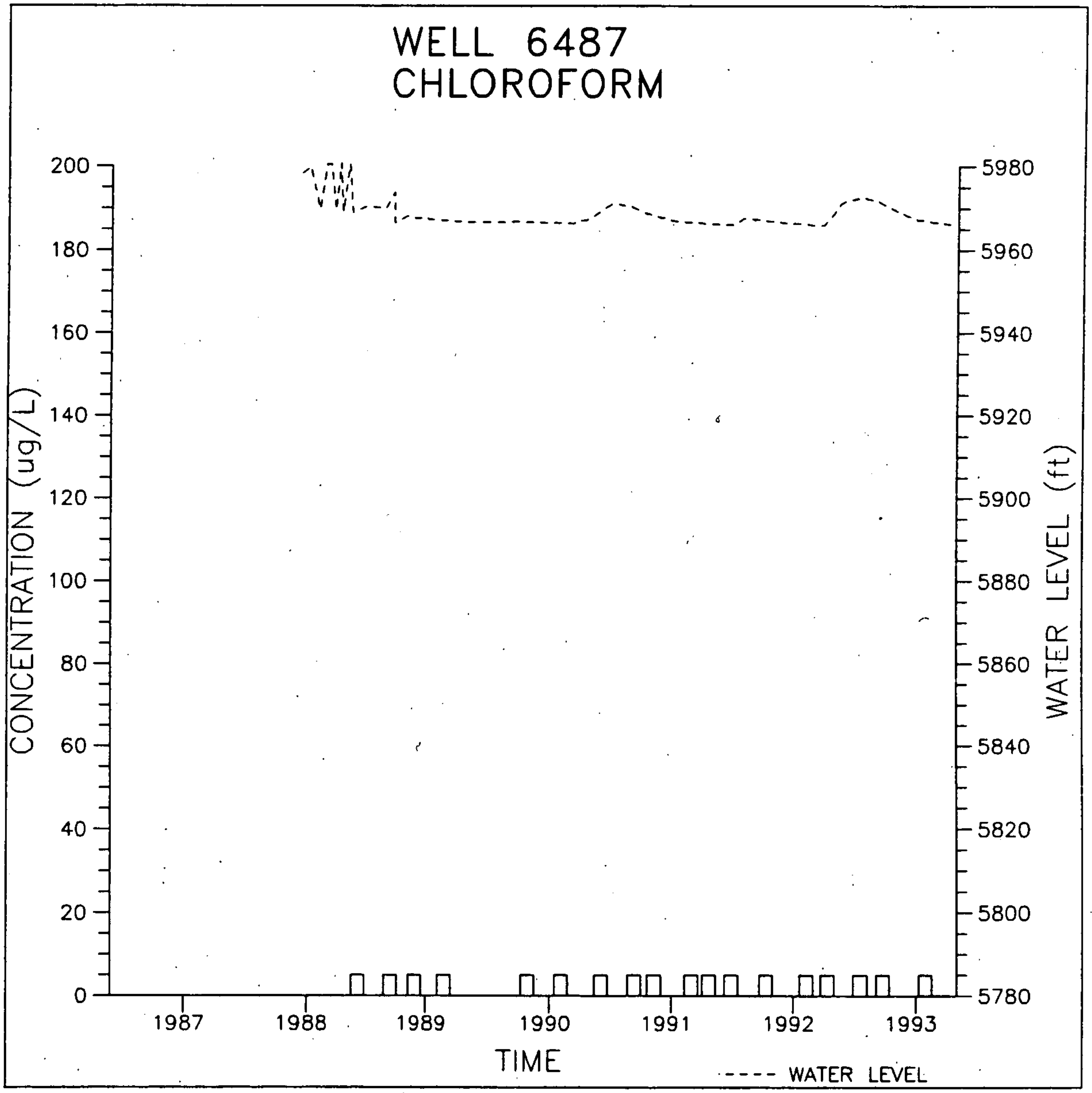
753

254


WELL 5687
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

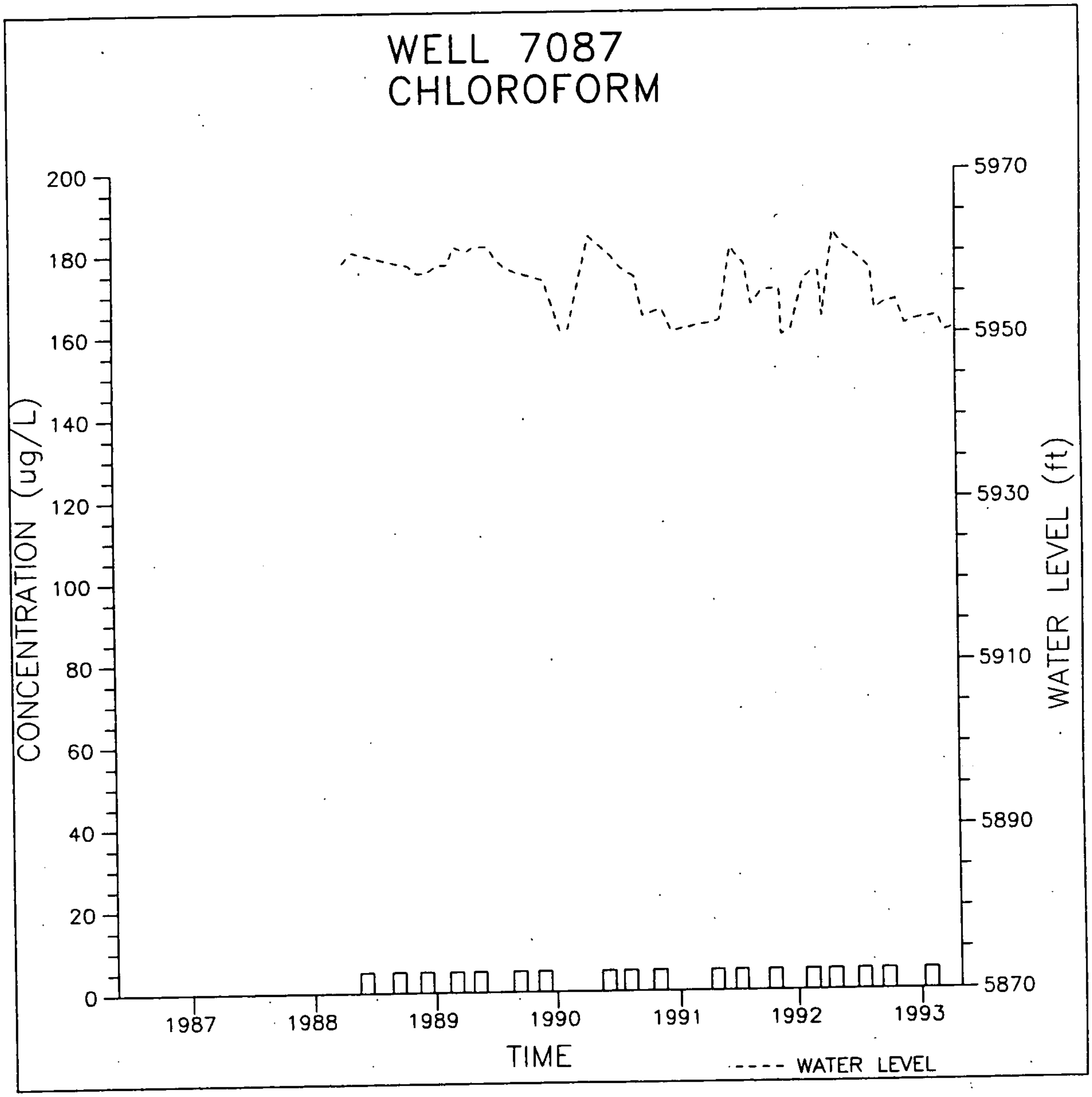
754

285



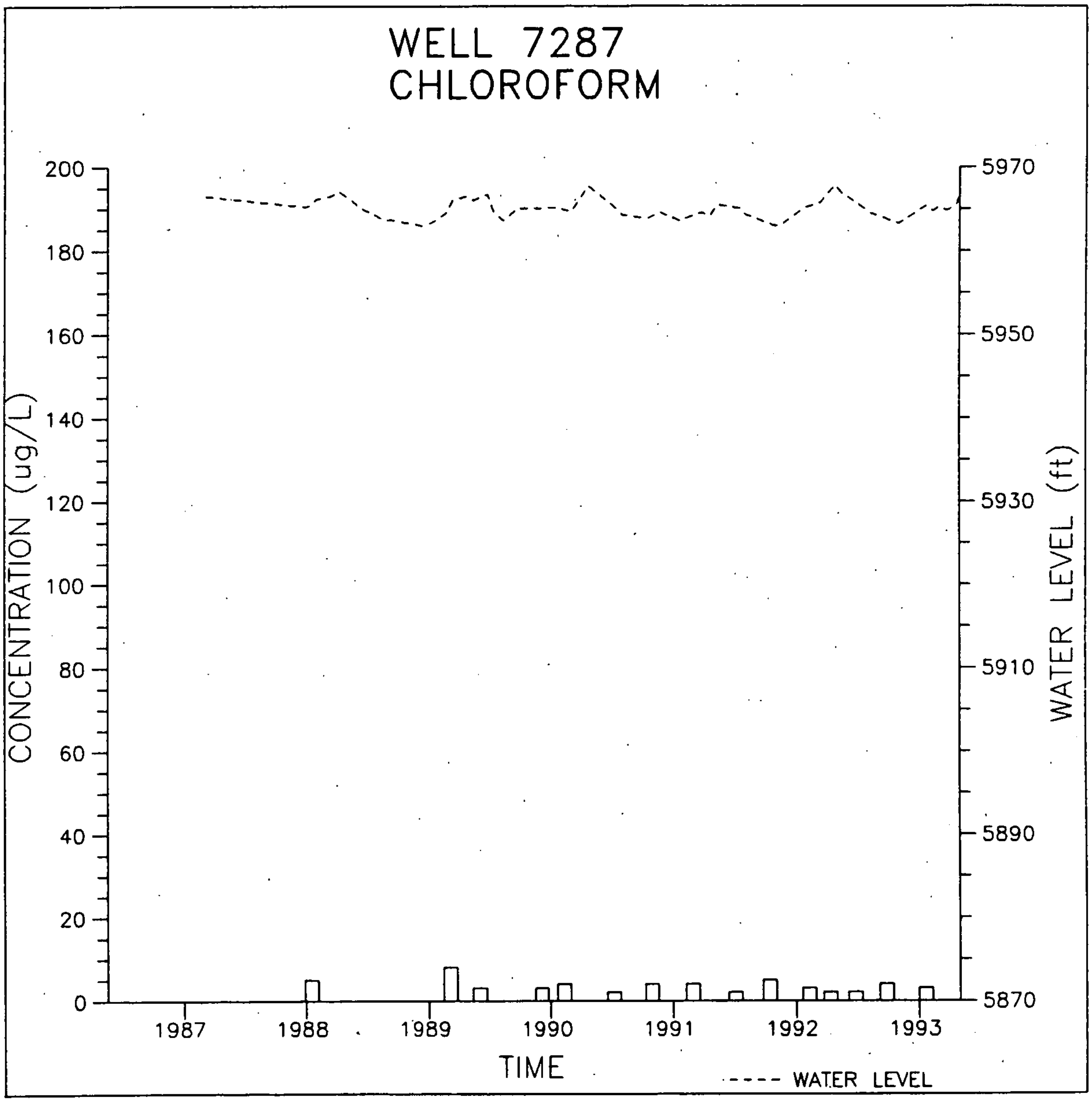
WELL 6487
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

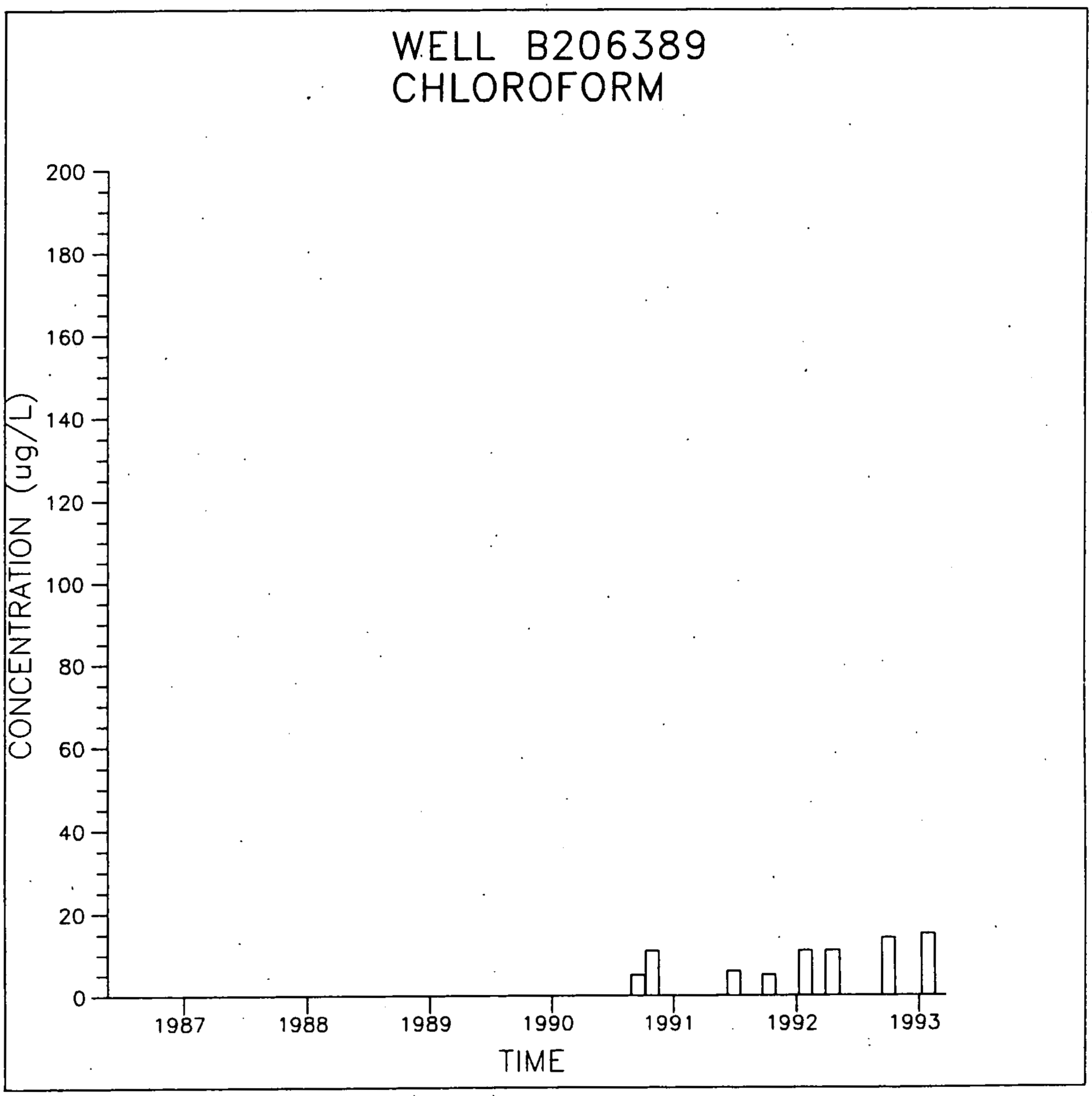
755


WELL 7087
CHLOROFORM
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5870
5890
5910
5930
5950
5970
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

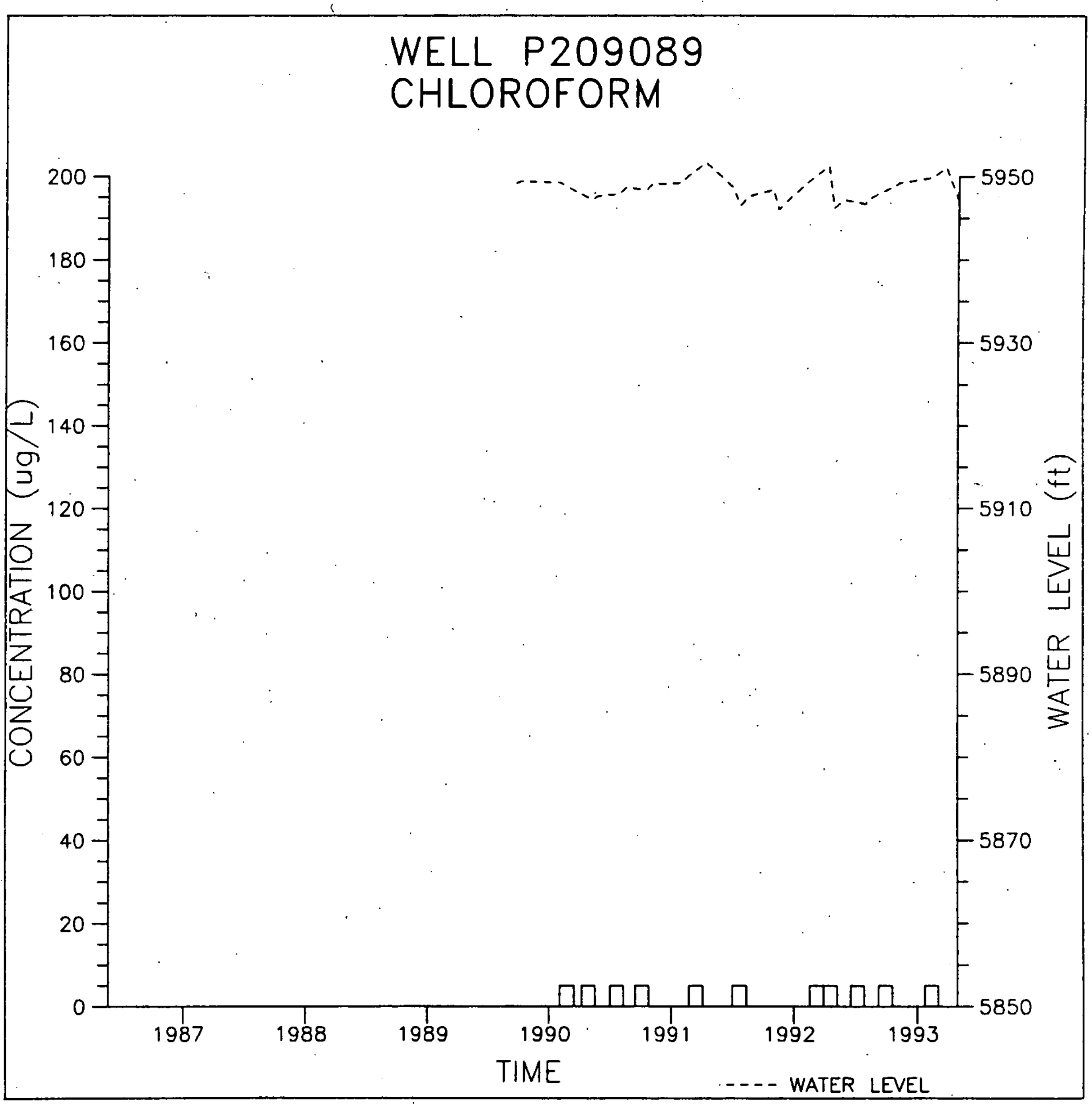
756

758


WELL 7287
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

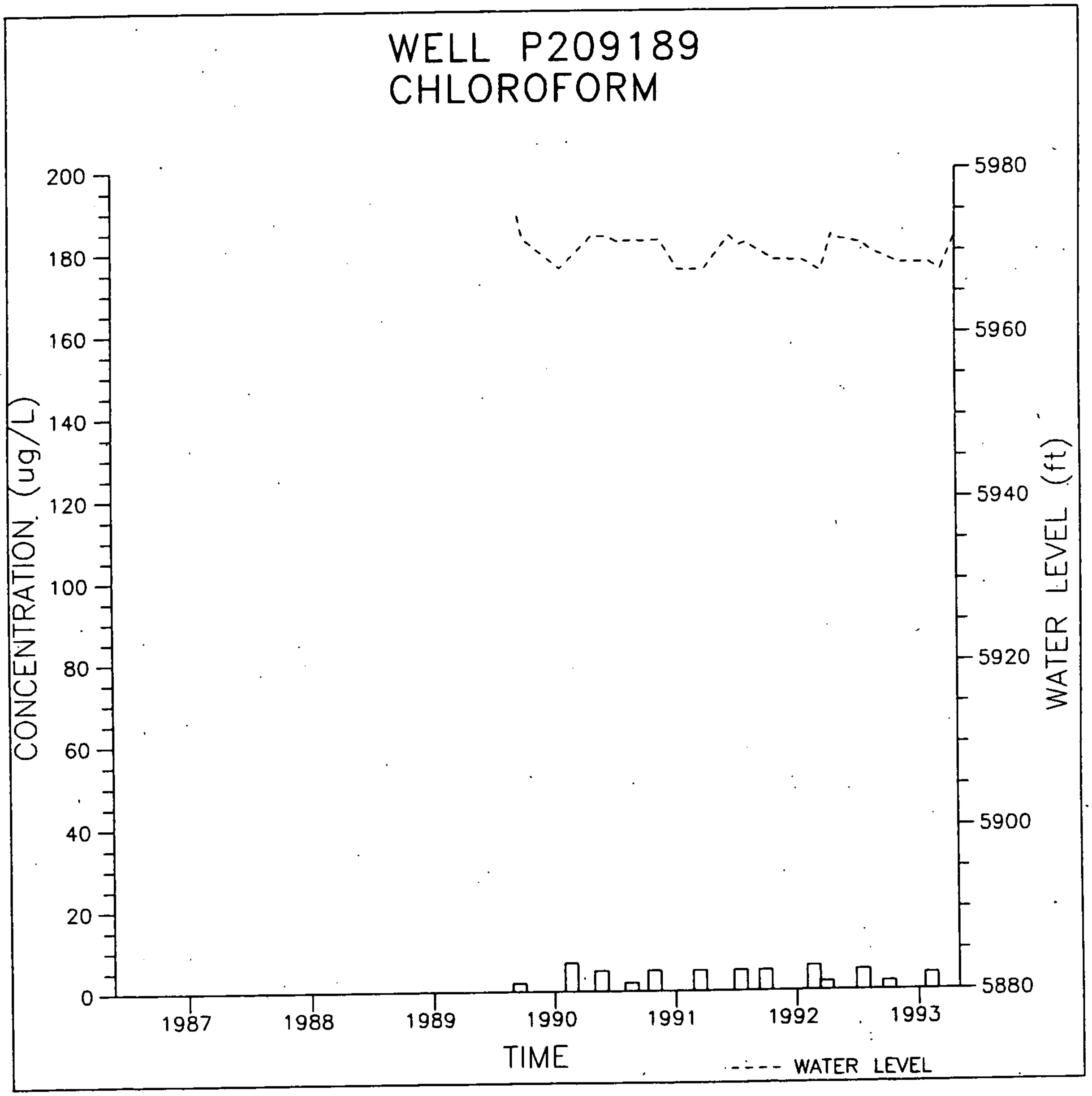

WELL B206389
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

758


WELL P209089
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

759

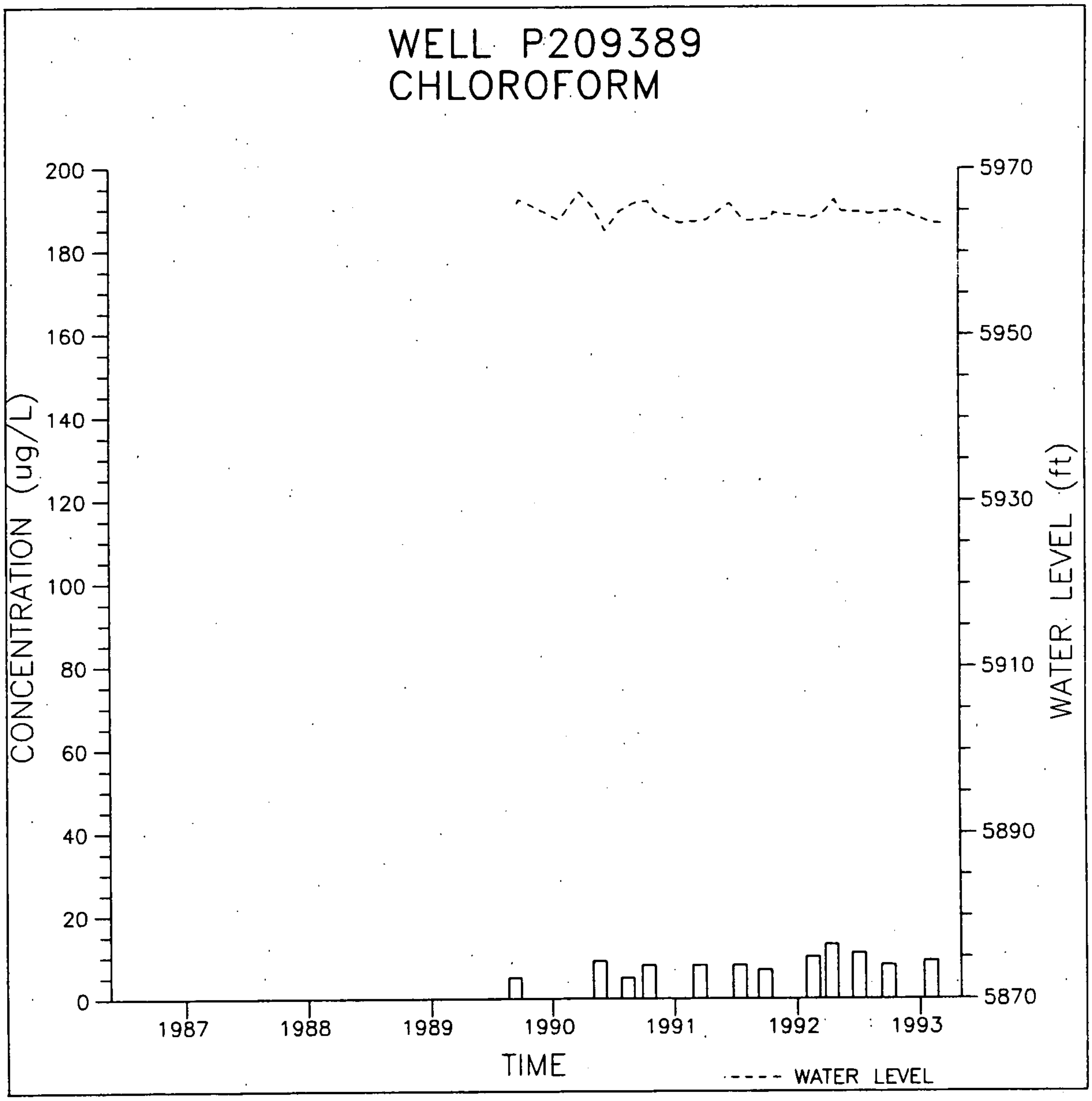
760



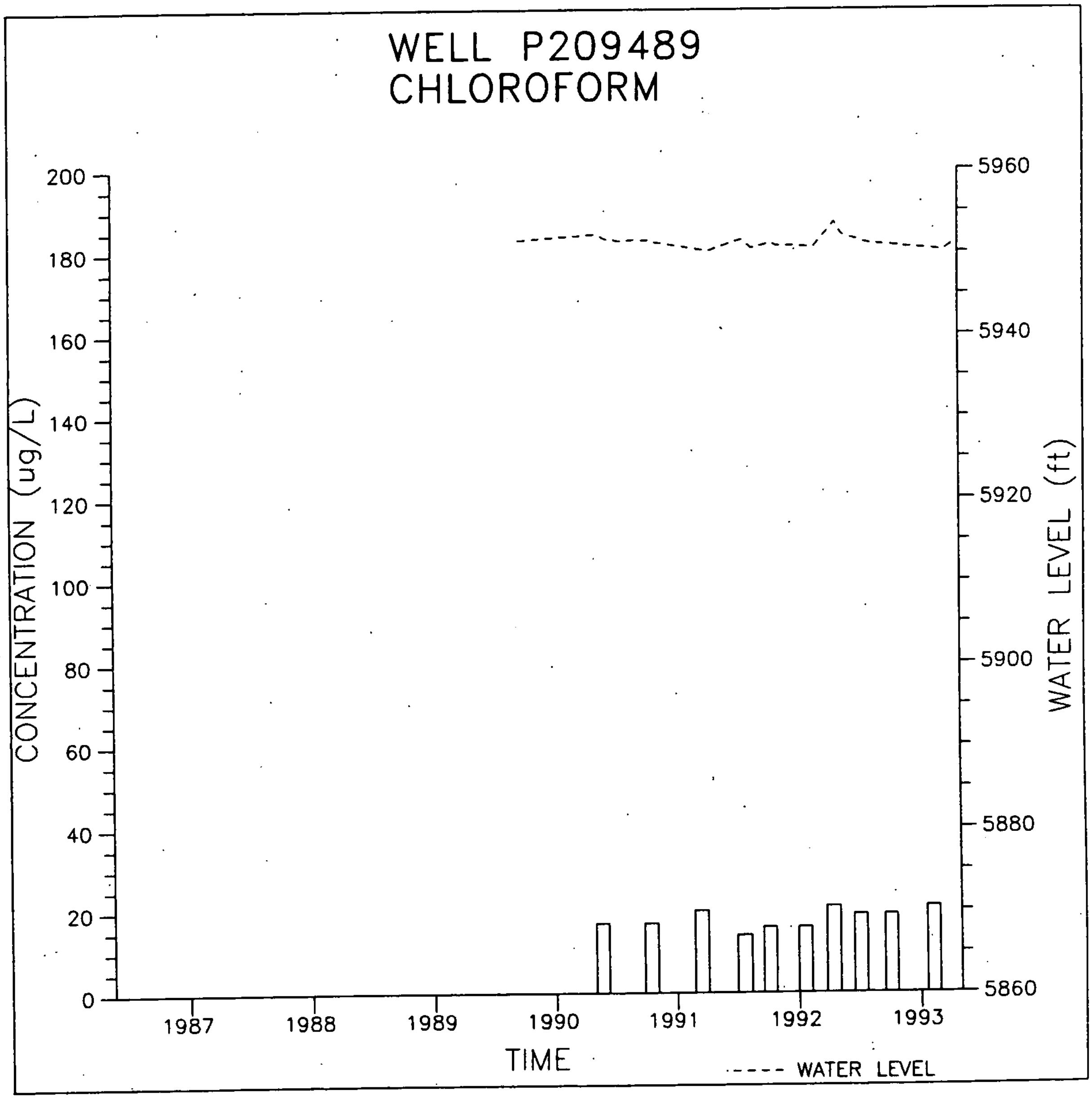
WELL P209189
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

760

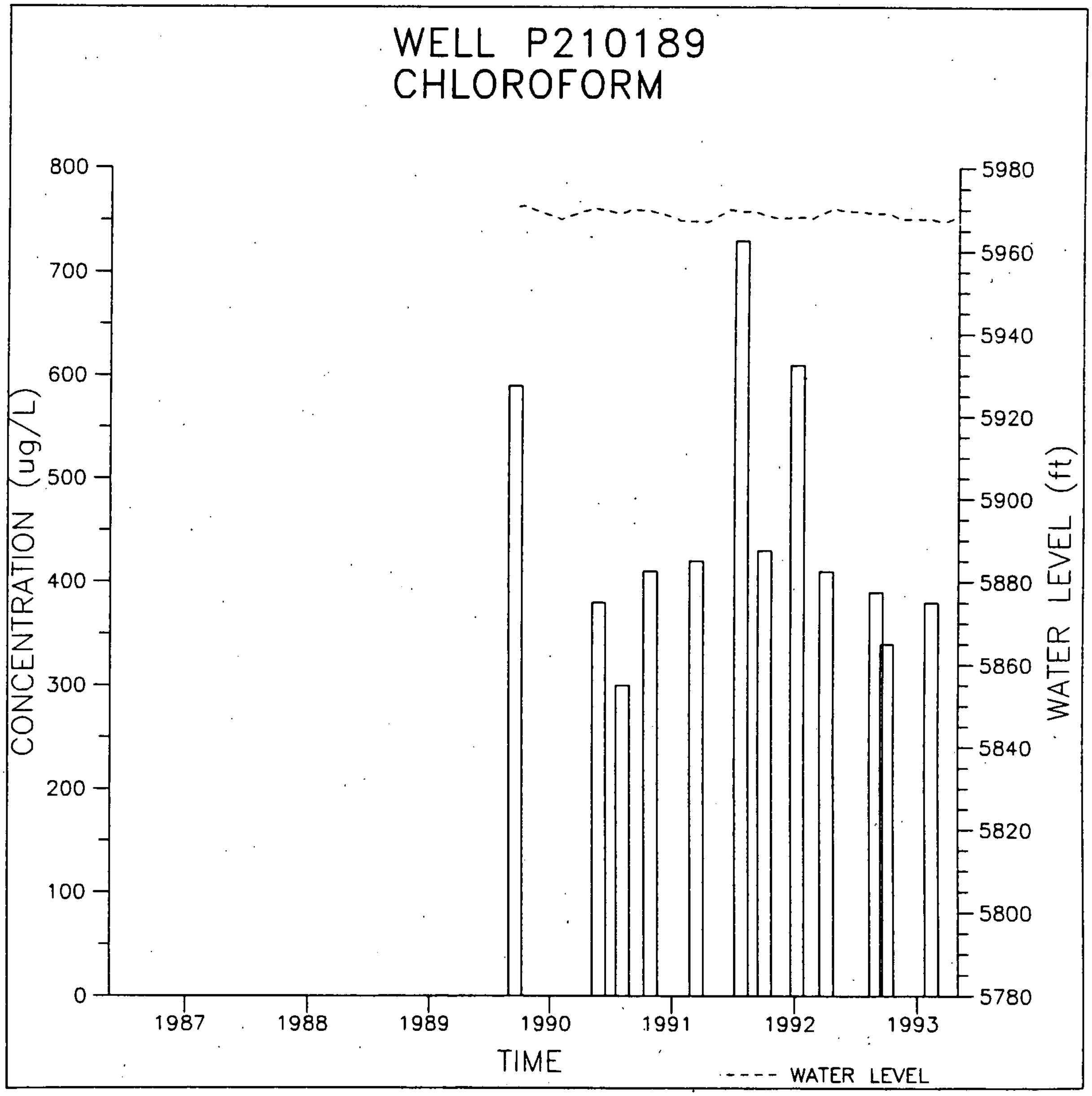
761


WELL P209389
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

761


WELL P209489
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

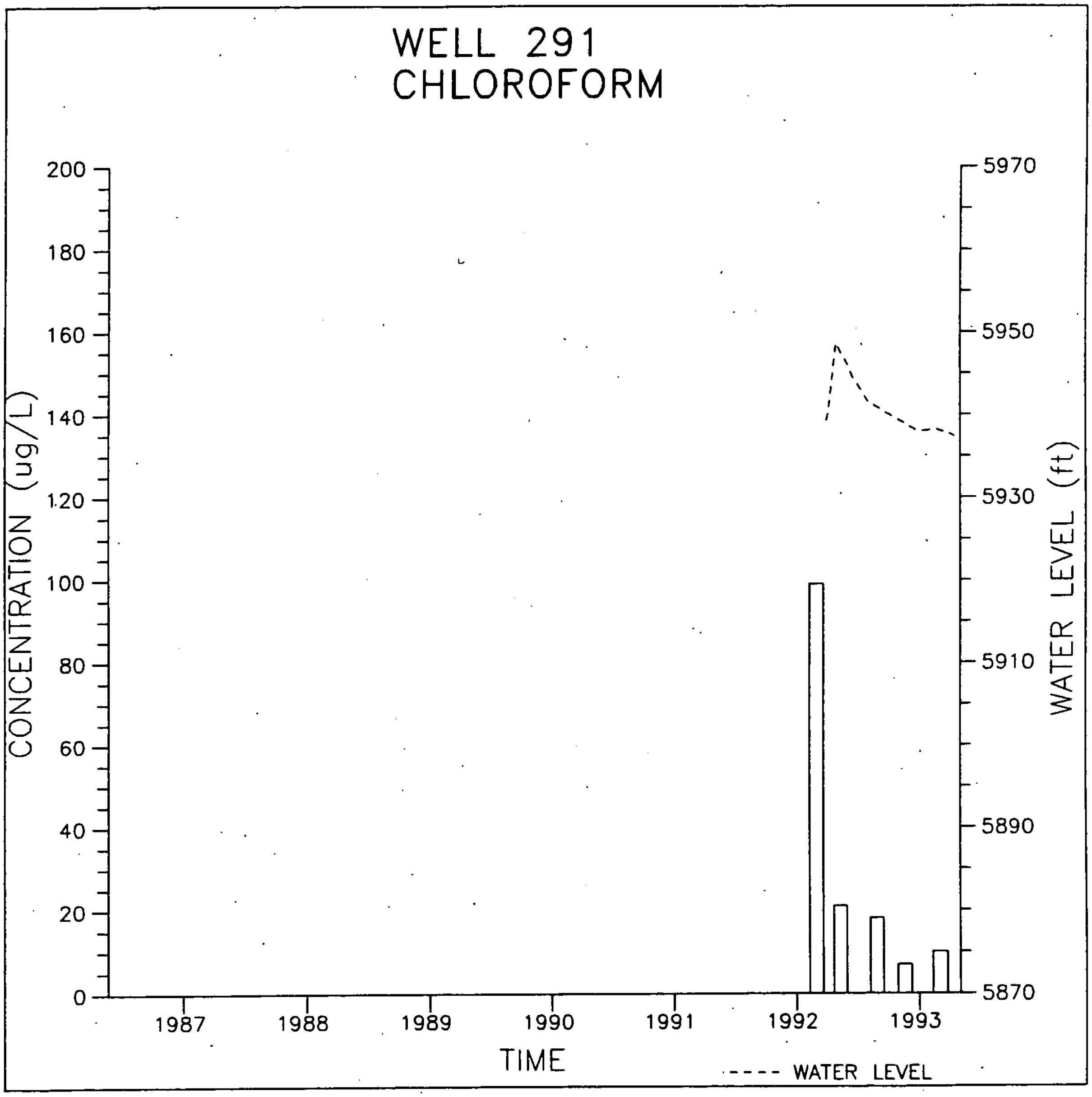
762



WELL P210189
CHLOROFORM
800
700
600
500
400
300
200
100
0
CONCENTRATION (ug/L)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

763

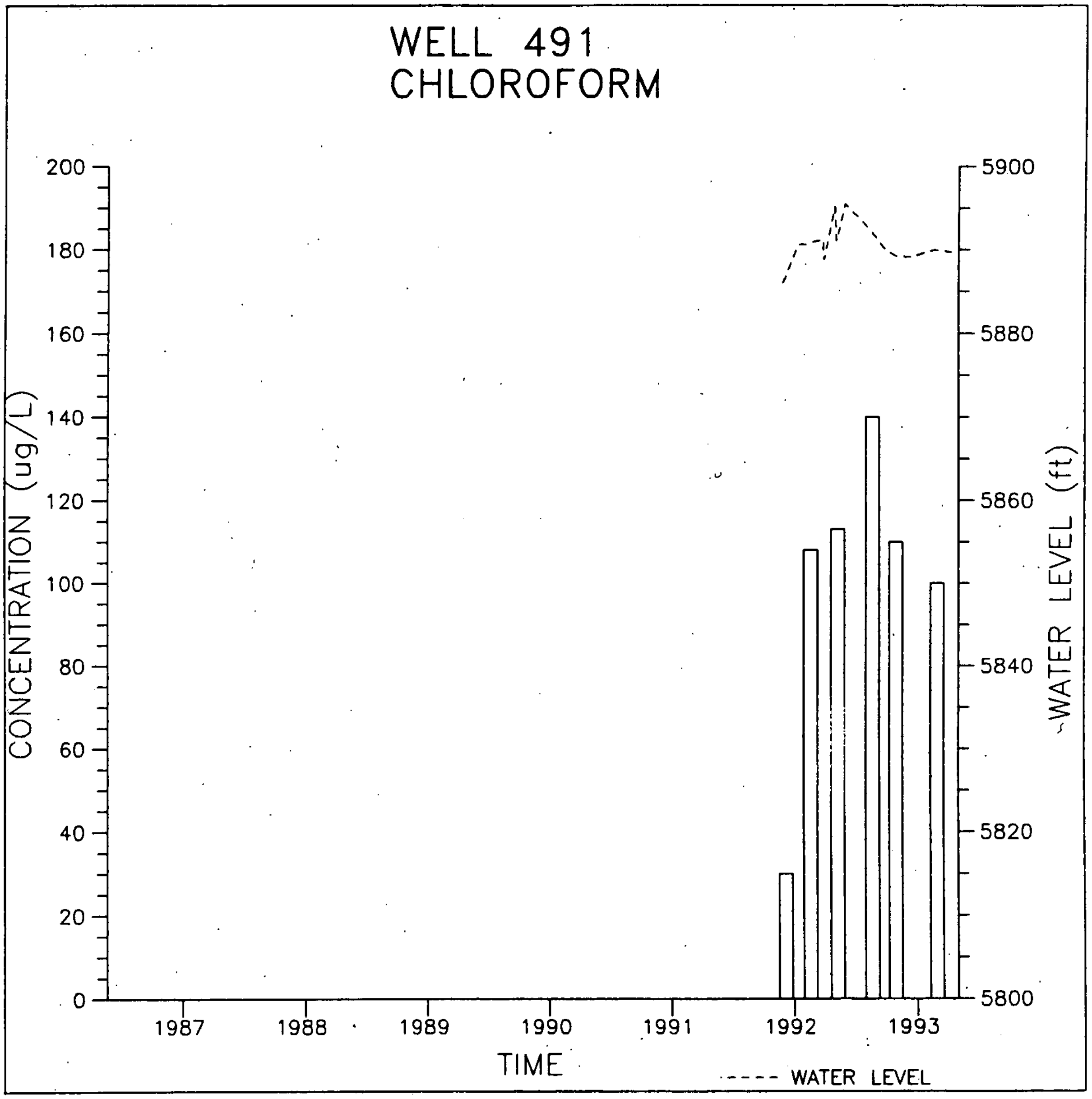
764



WELL 291
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

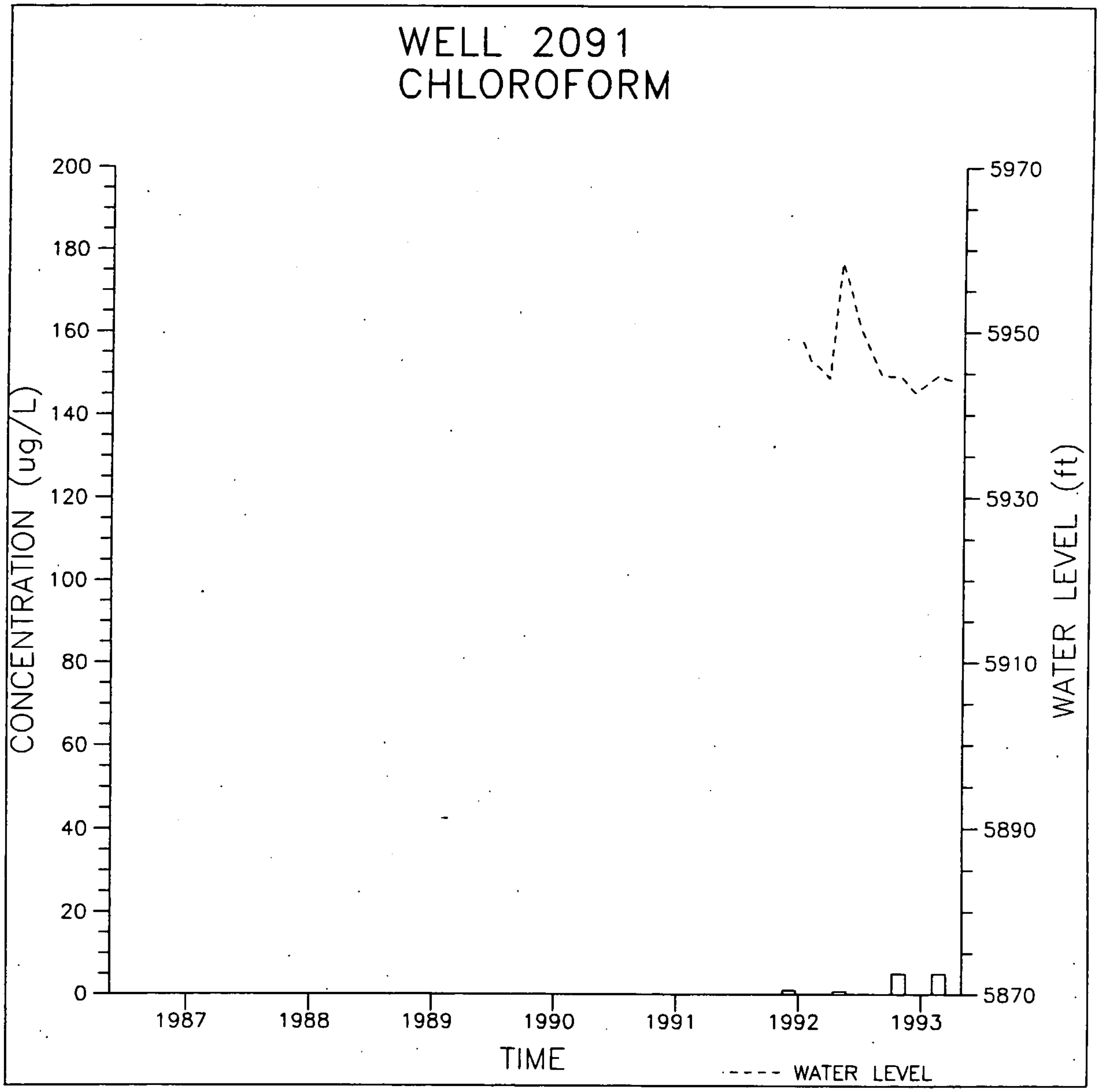
764

265


WELL 491
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
0
20
40
60
80
100
120
140
160
180
200
5800
5820
5840
5860
5880
5900
1987
1988
1989
1990
1991
1992
1993
---- WATER LEVEL

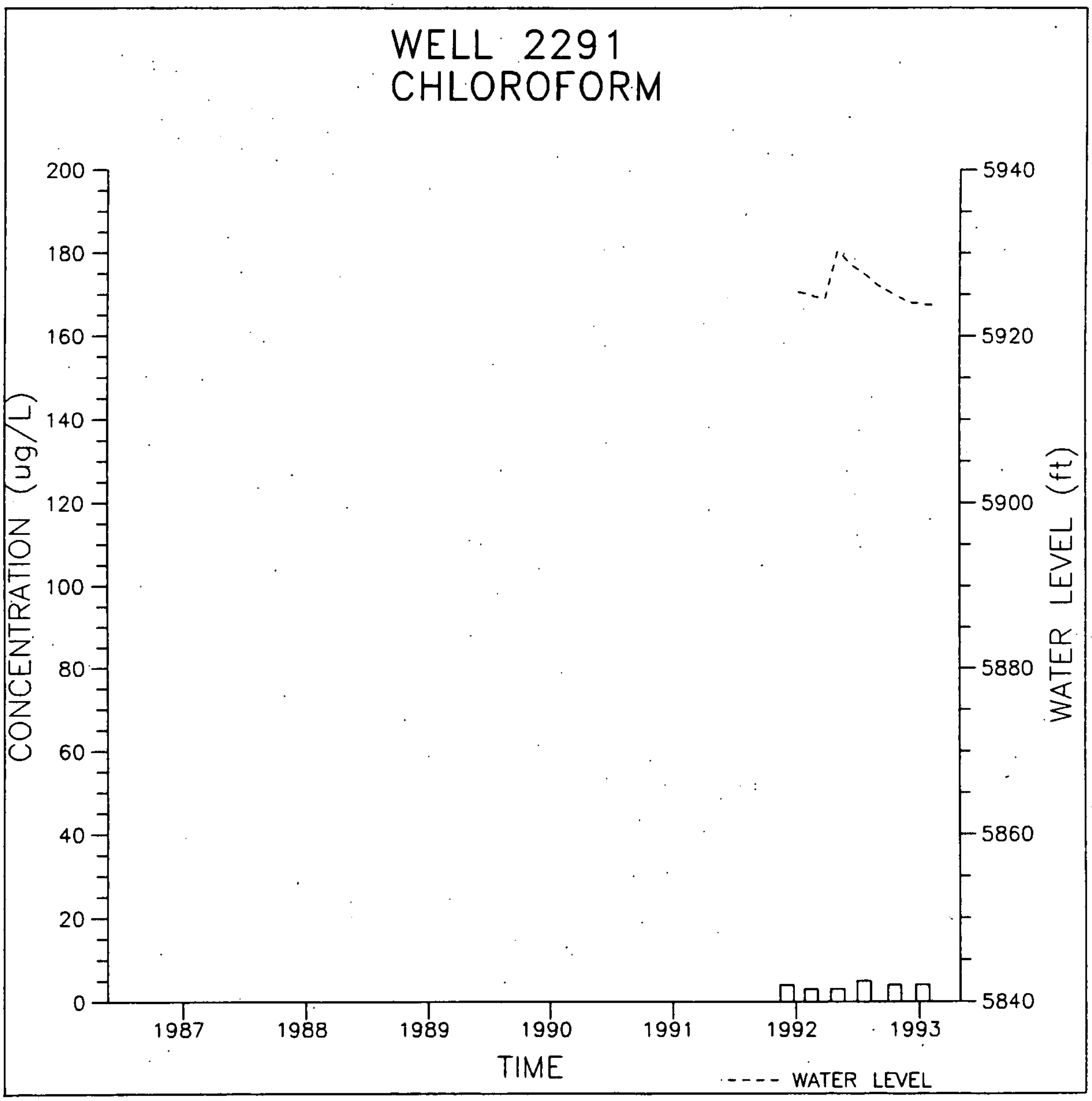
765

766



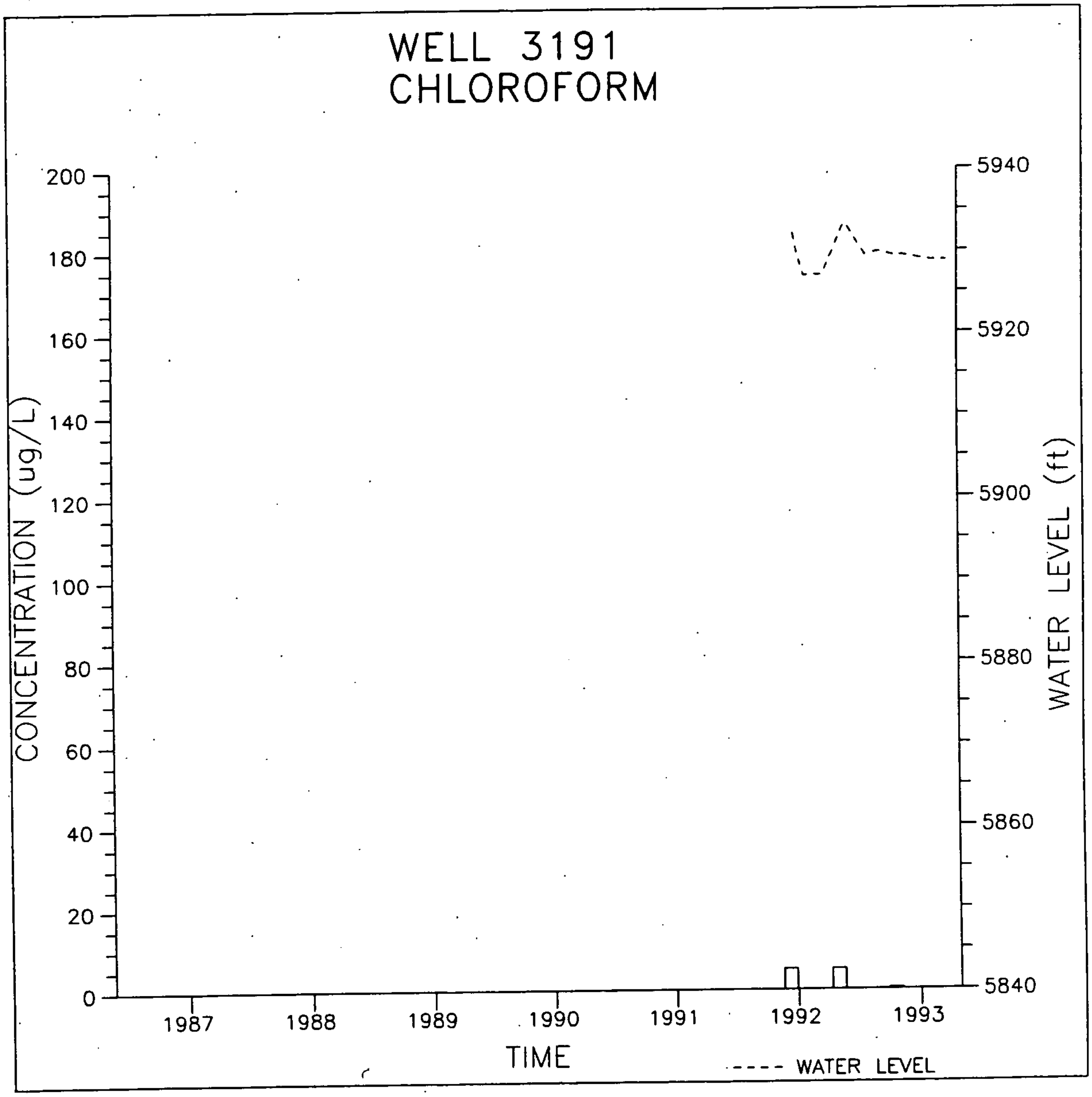
WELL 2091
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

766



WELL 2291
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5940
5920
5900
5880
5860
5840
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

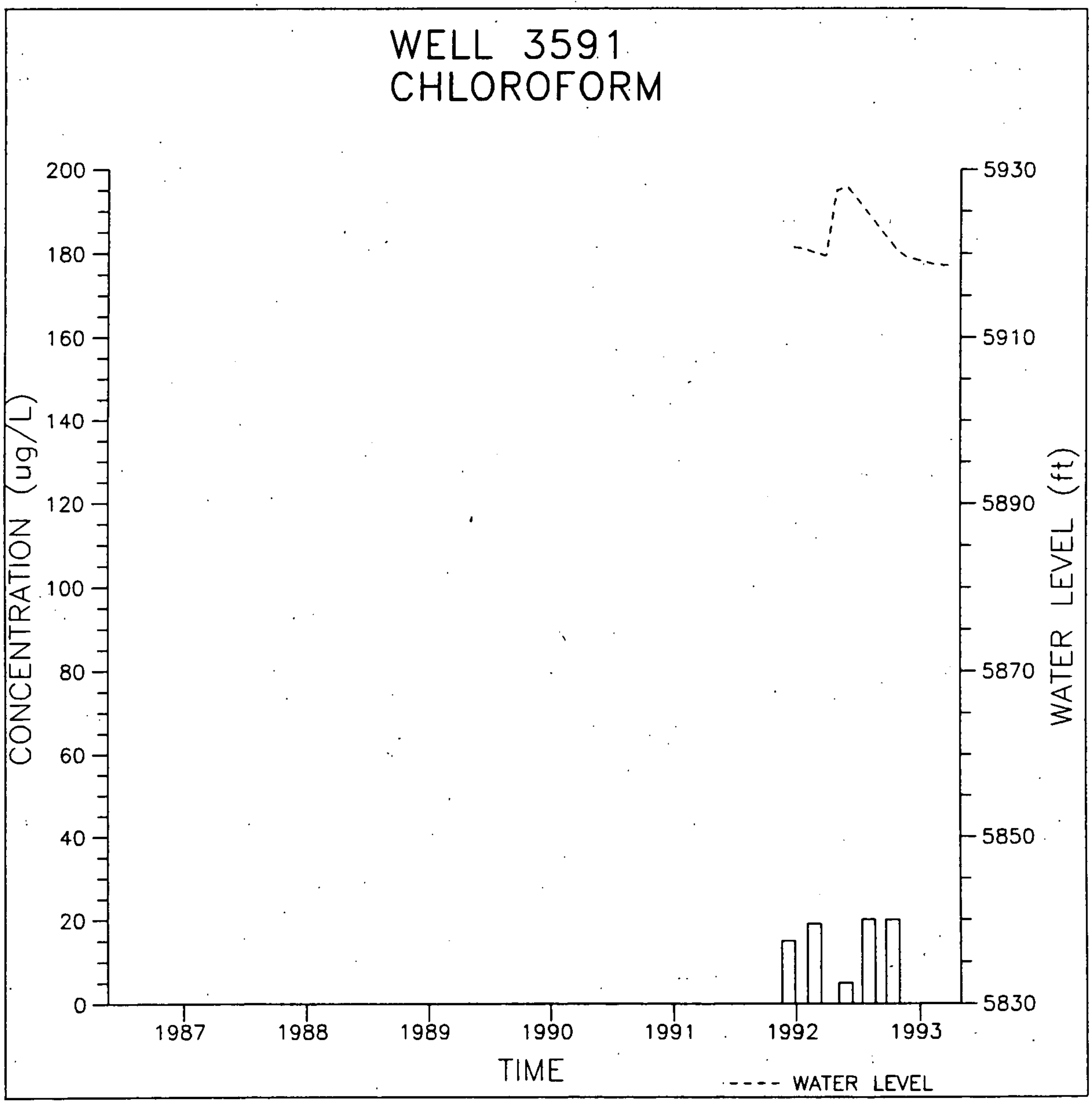
767



WELL 3191
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

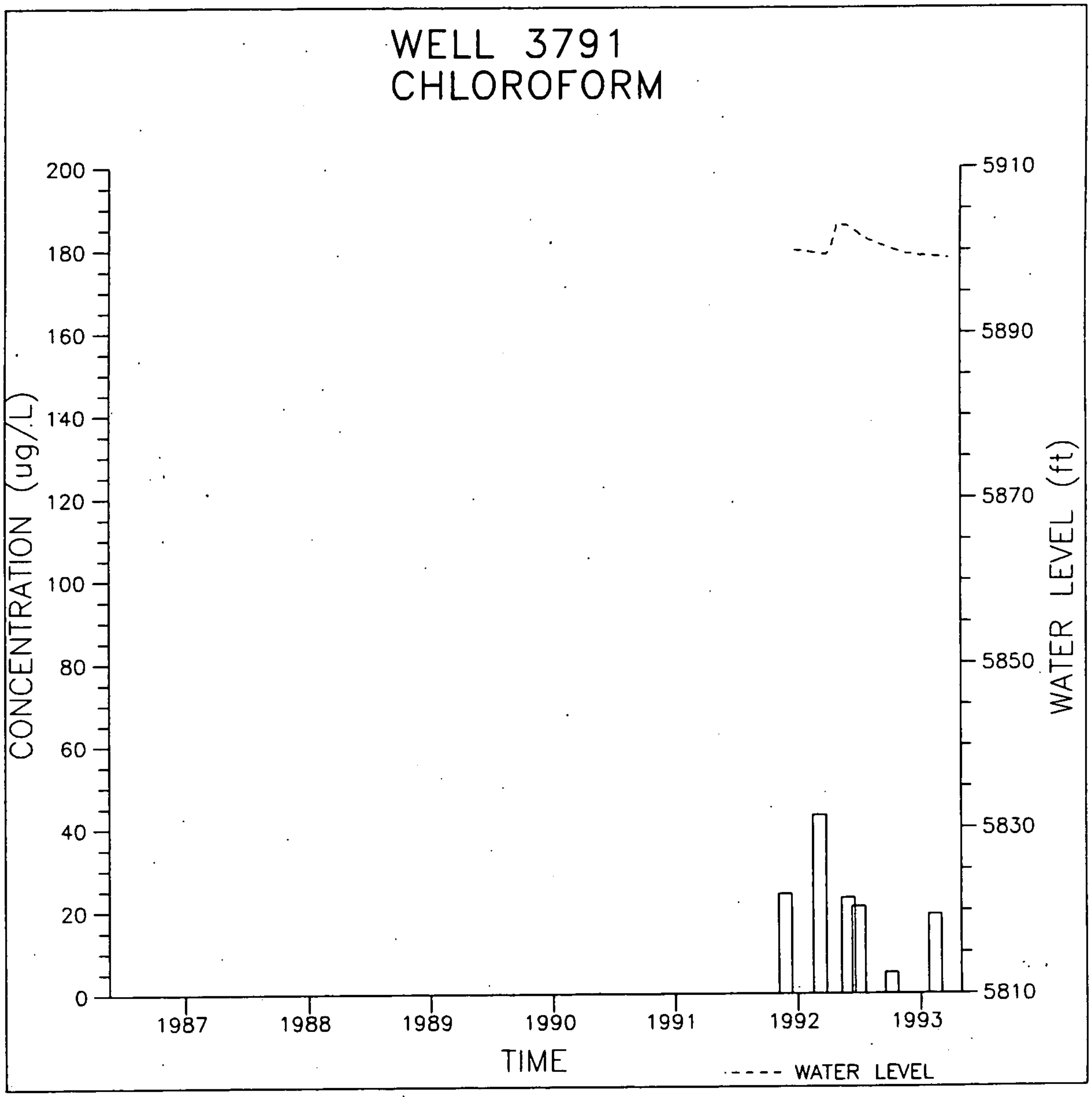
768

289

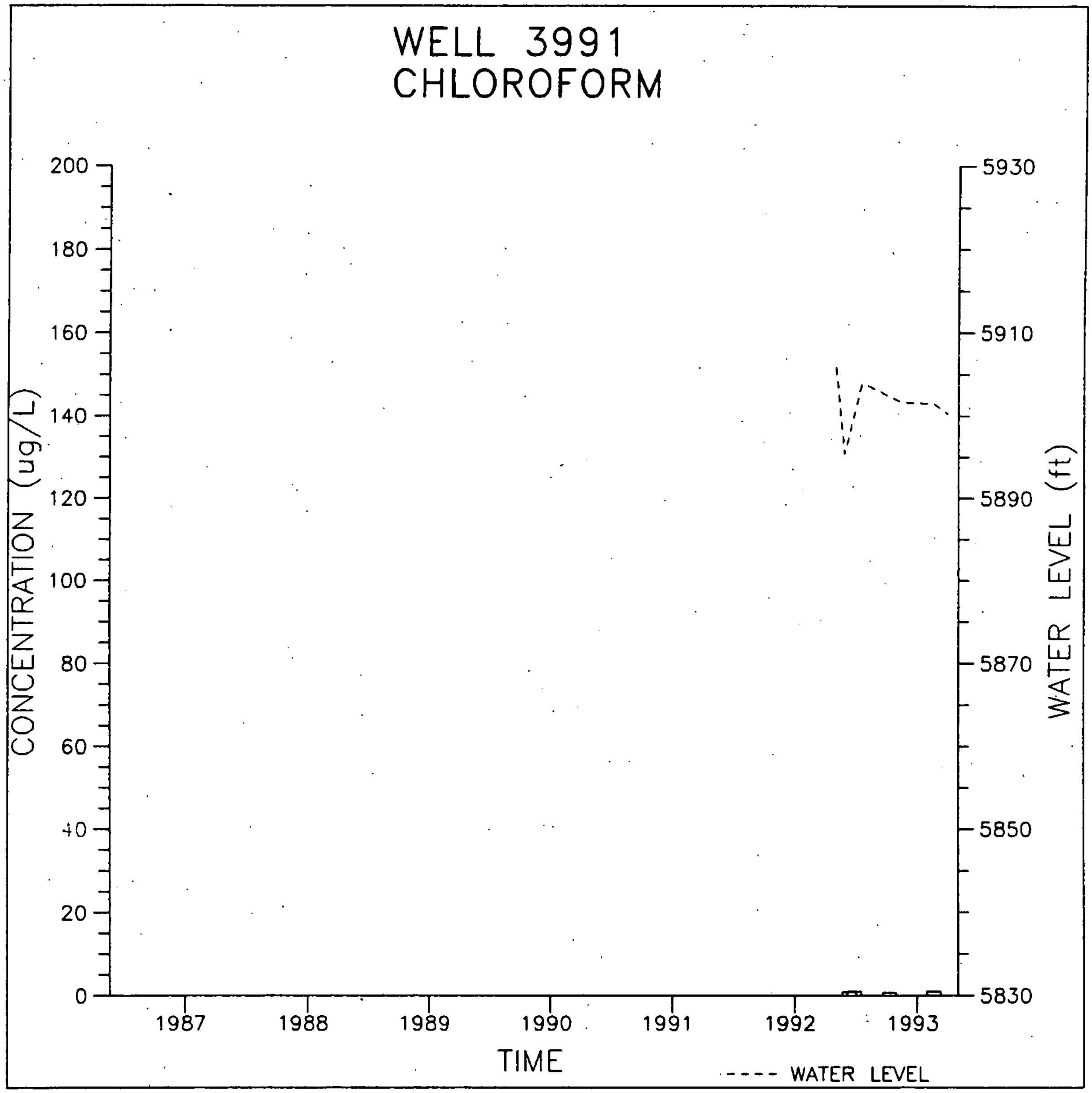


WELL 3591
CHLOROFORM
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

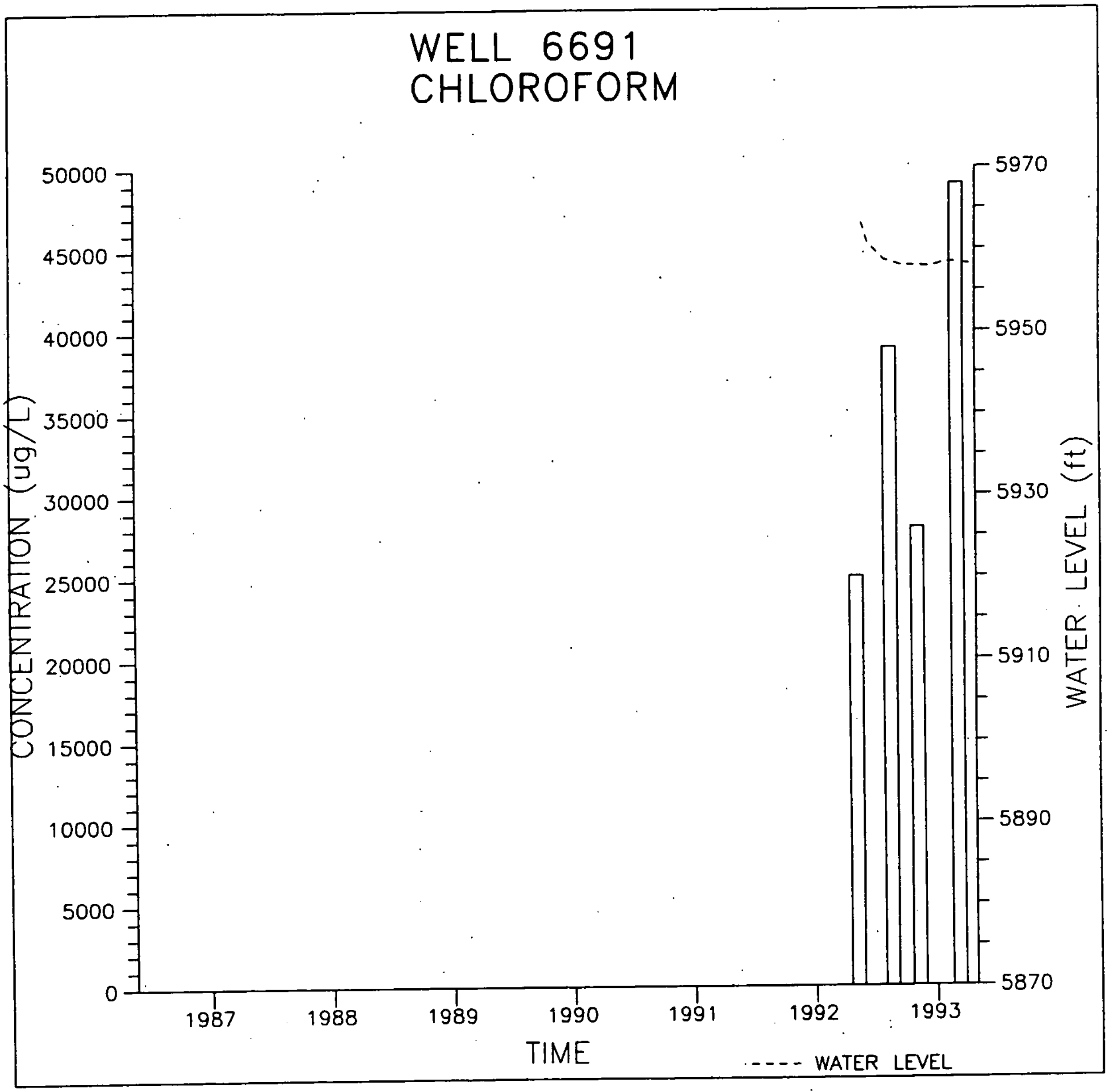
769


WELL 3791
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
5910
5890
5870
5850
5830
5810
WATER LEVEL (ft)
---- WATER LEVEL

770


WELL 3991
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

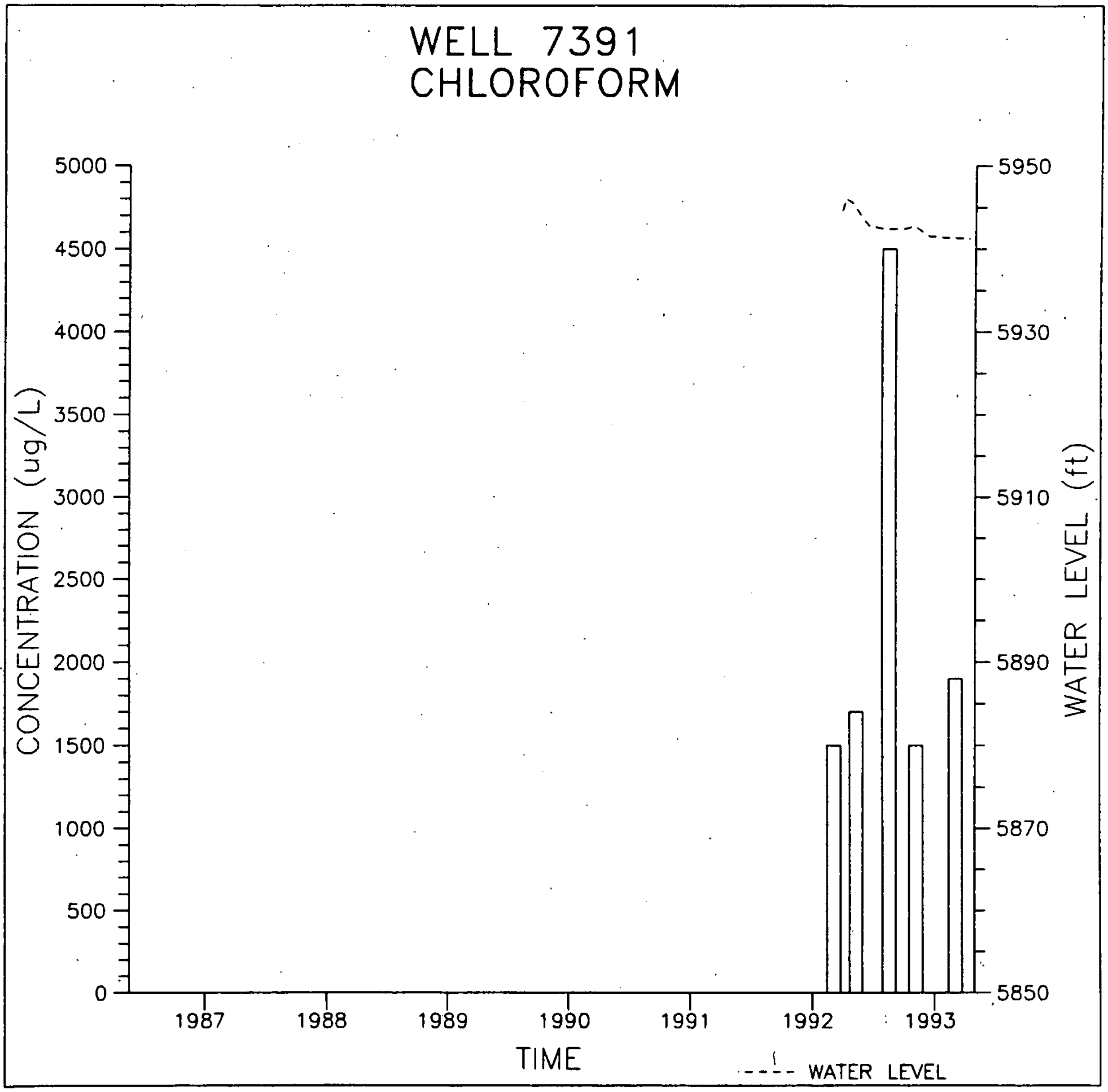
771



WELL 6691
CHLOROFORM
CONCENTRATION (ug/L)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

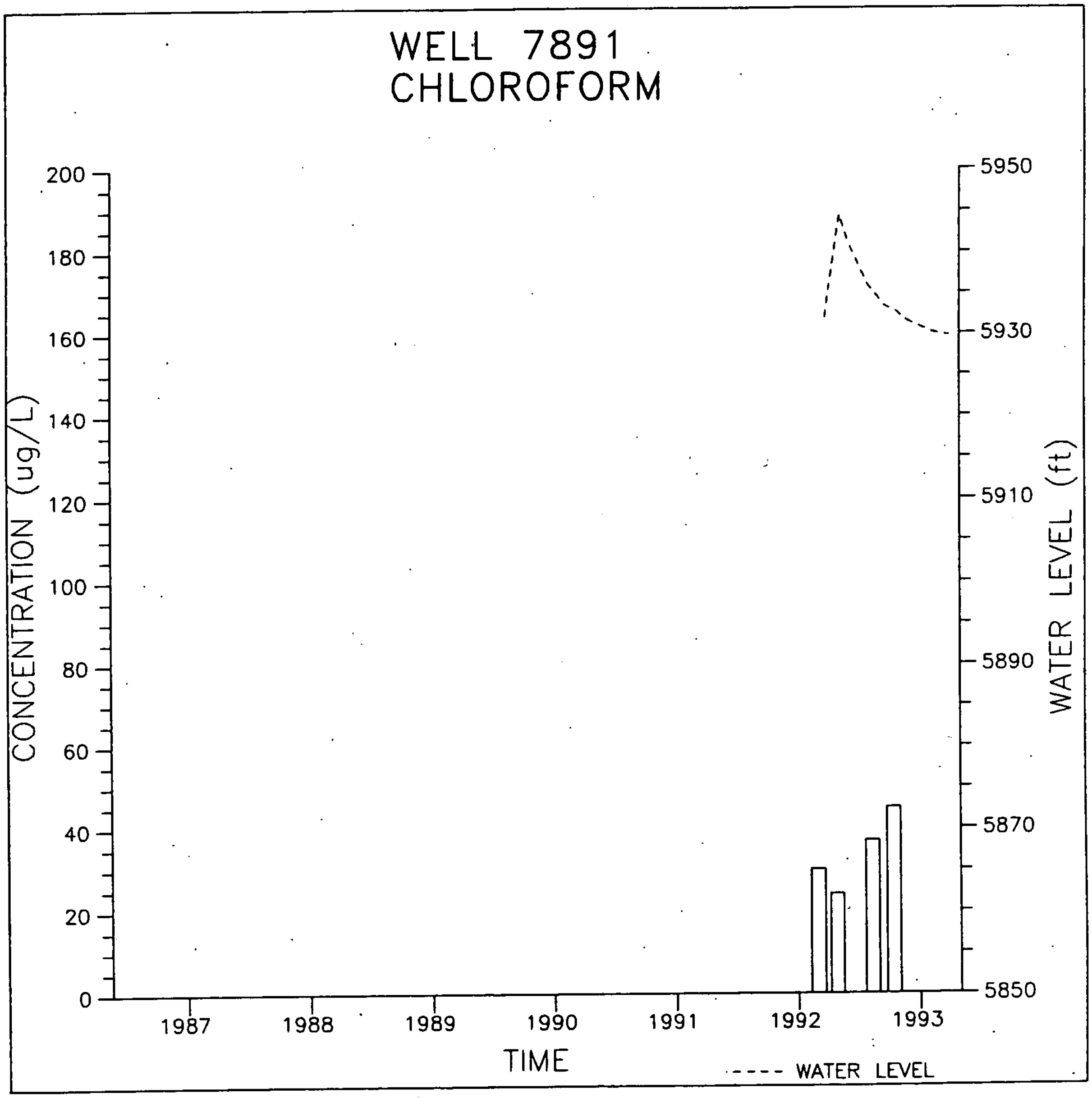
772

783



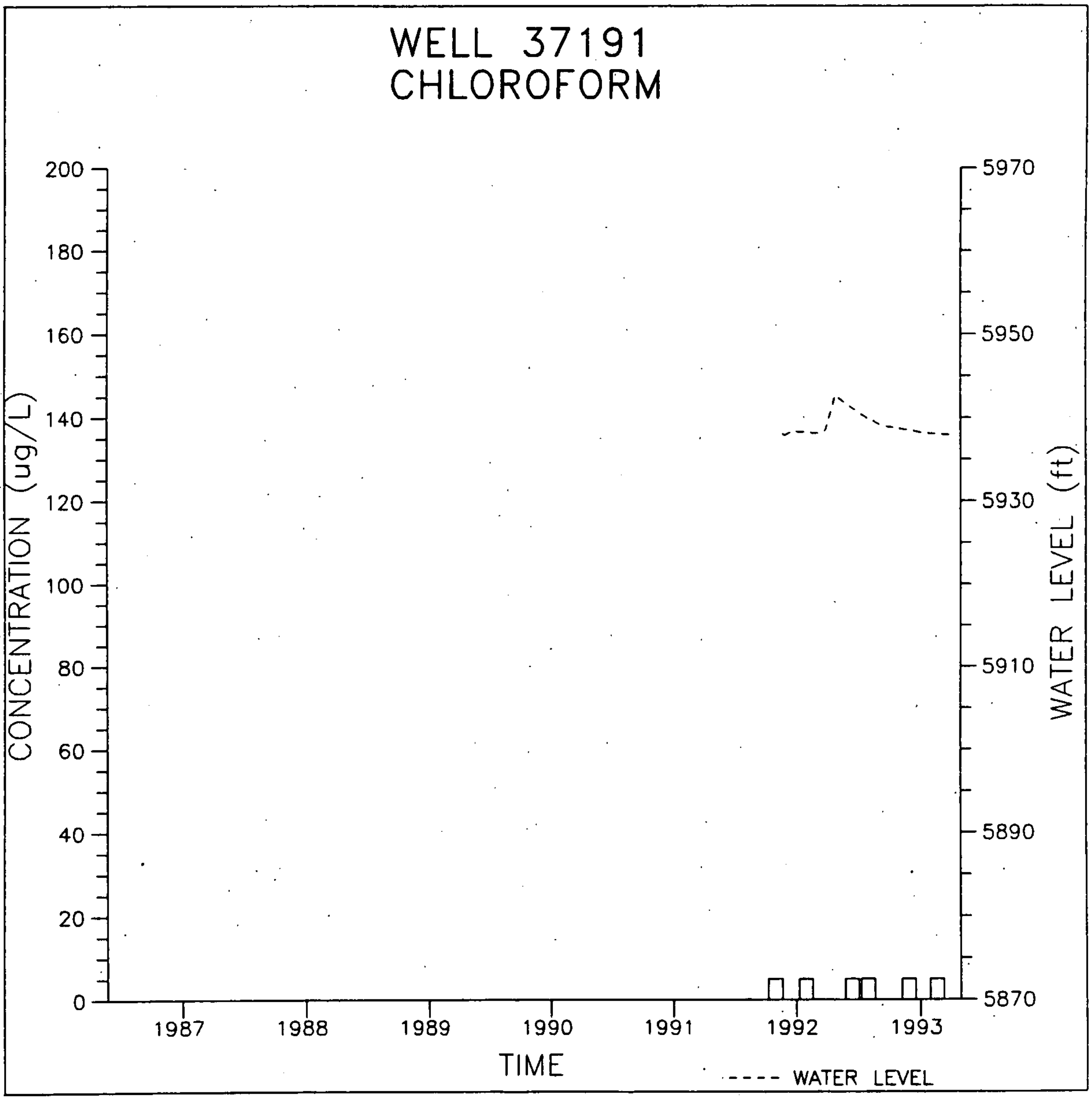
WELL 7391
CHLOROFORM
CONCENTRATION (ug/L)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

773

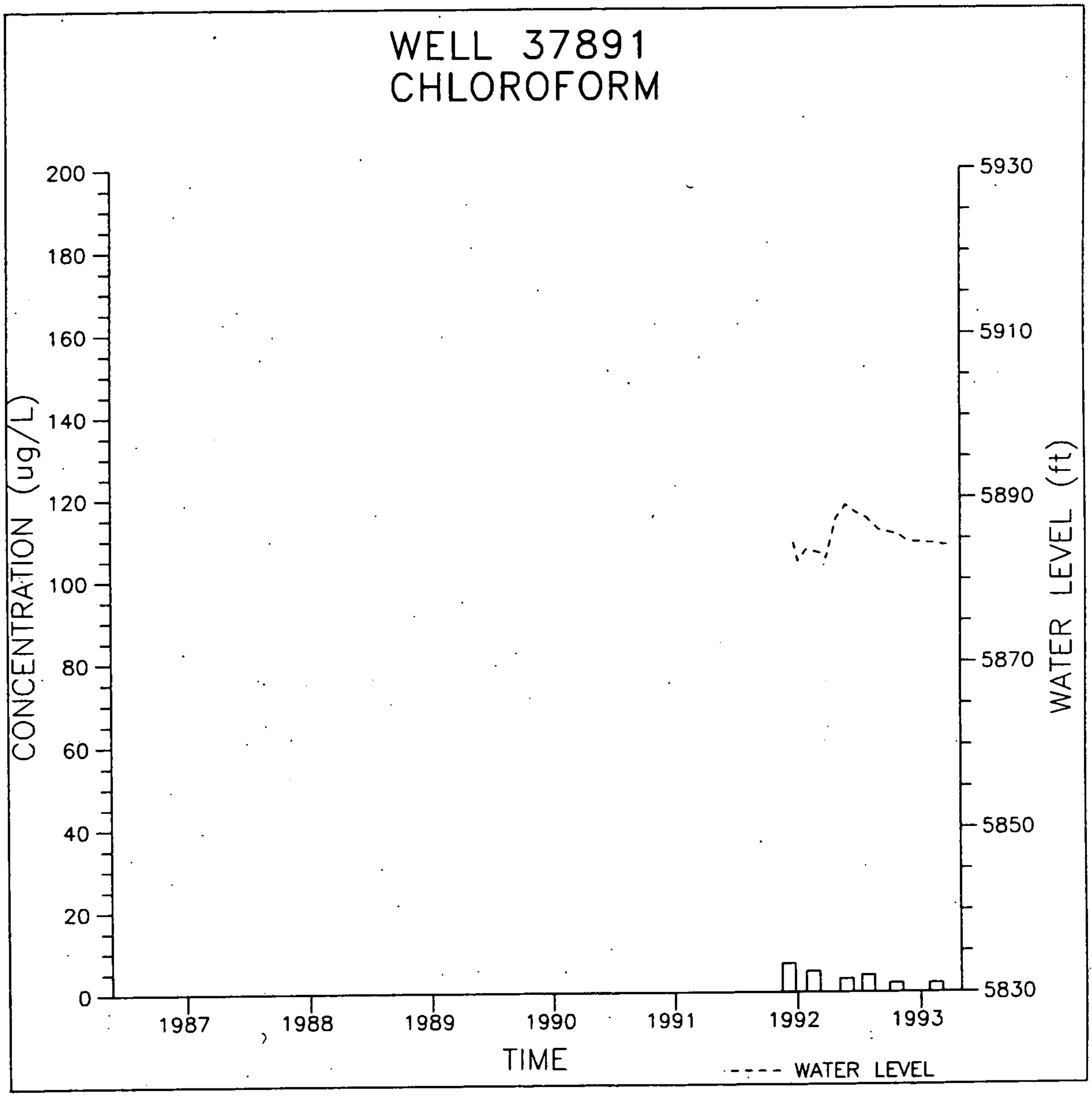

WELL 7891
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

774

785

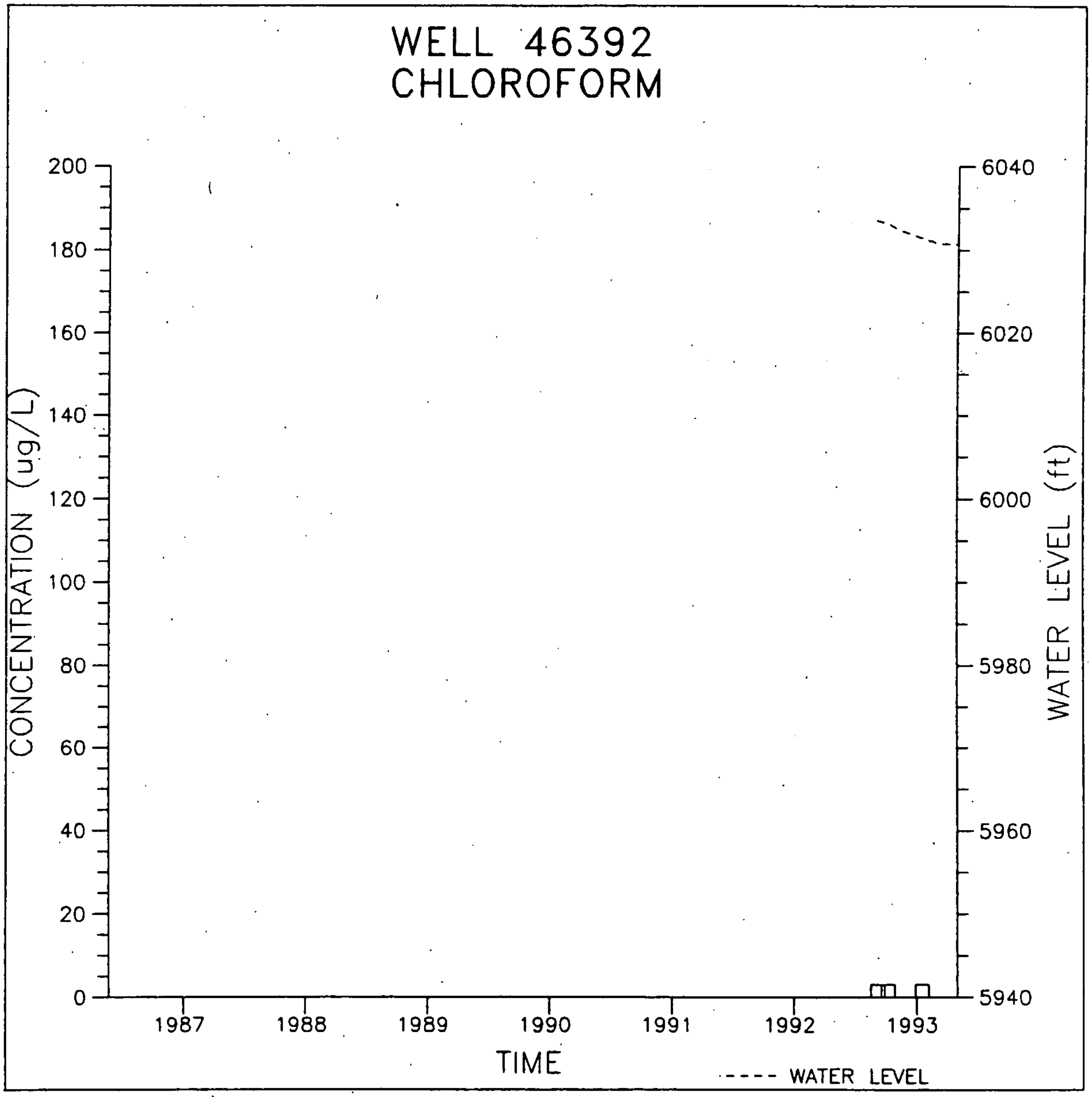

WELL 37191
CHLOROFORM
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

775


WELL 37891
CHLOROFORM
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5830
5850
5870
5890
5910
5930
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

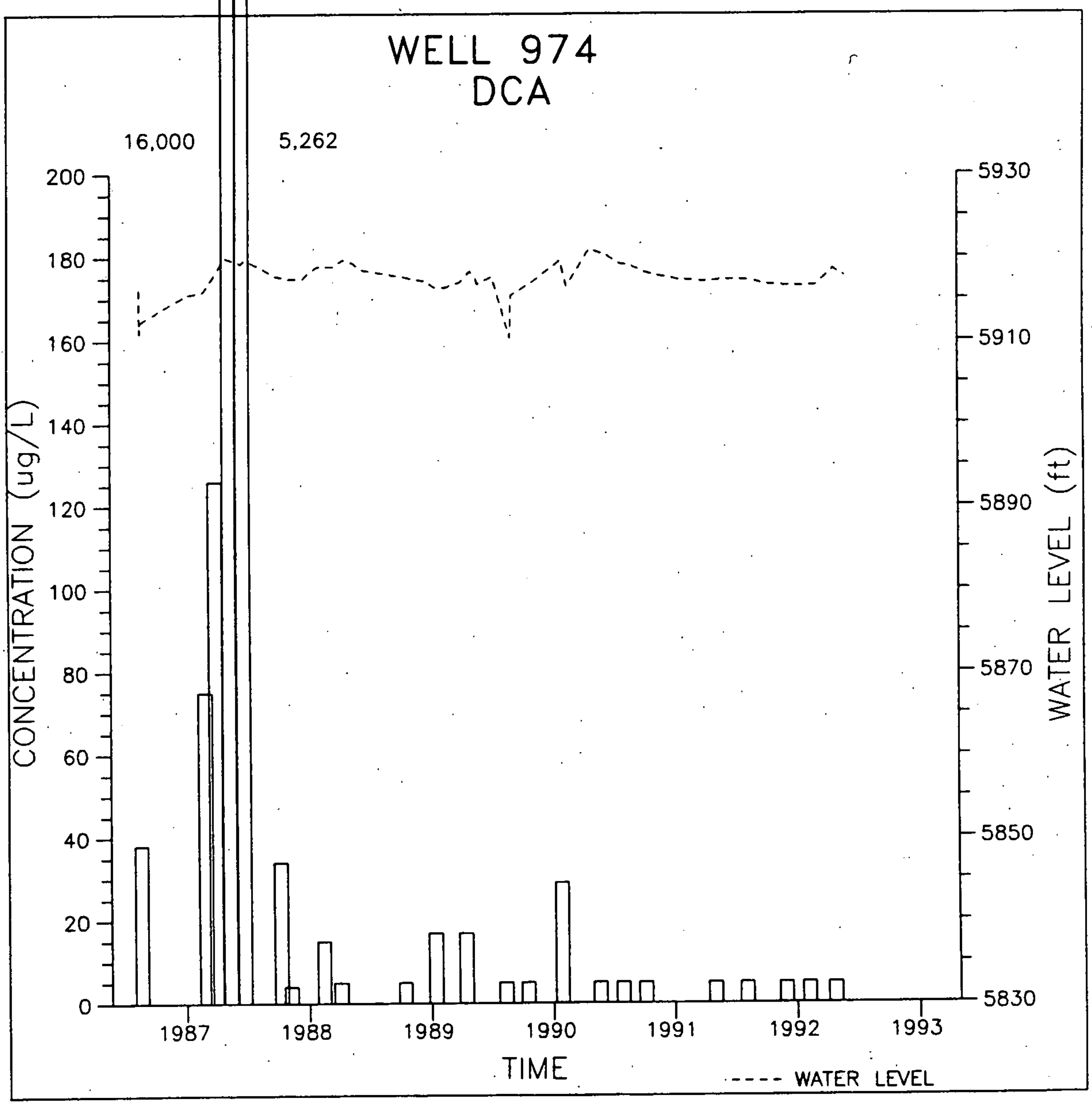
776

387
374



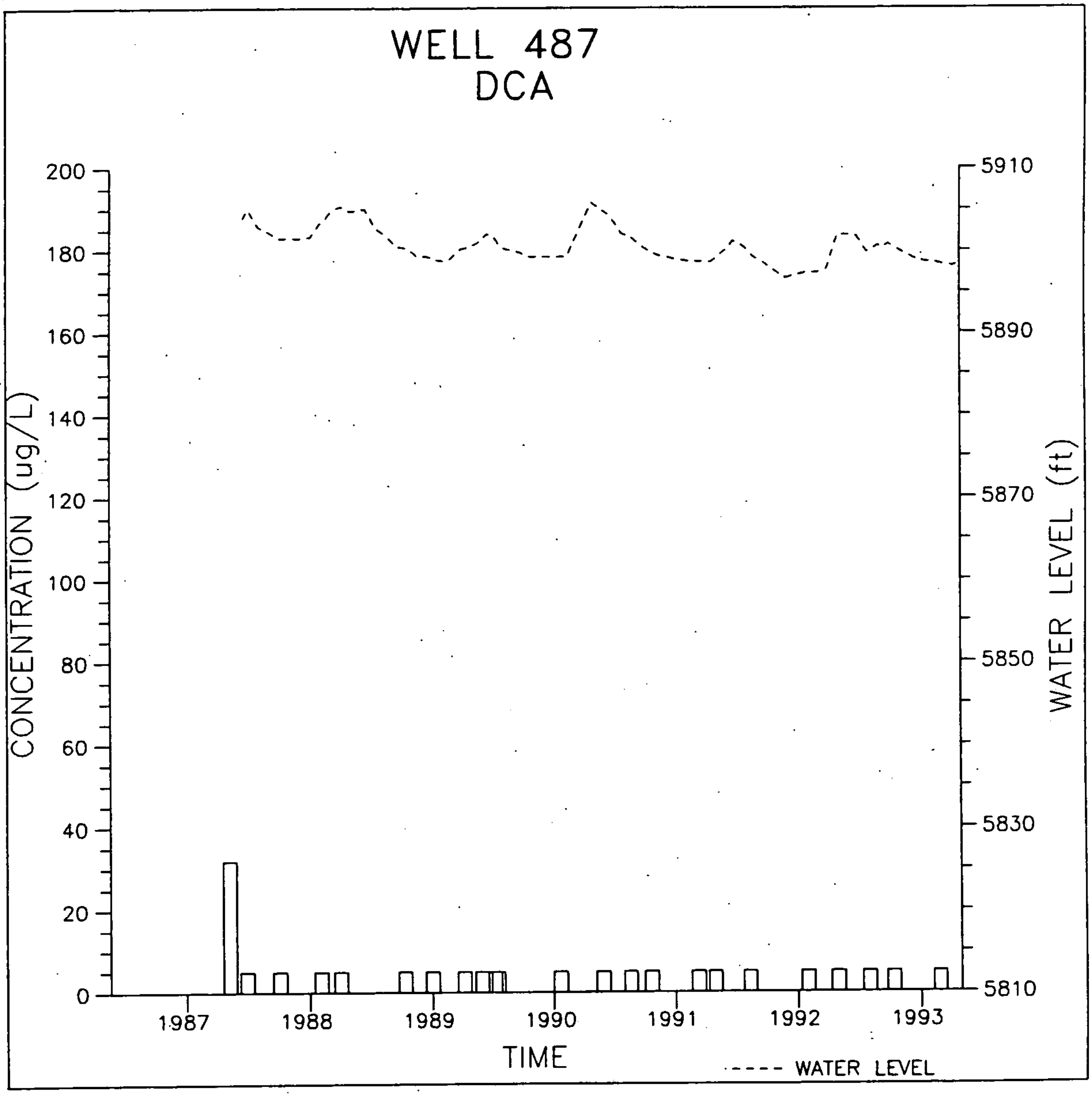
WELL 46392
CHLOROFORM
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6040
6020
6000
5980
5960
5940
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

777


WELL 974
DCA
16,000
5,262
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5930
5910
5890
5870
5850
5830
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

778

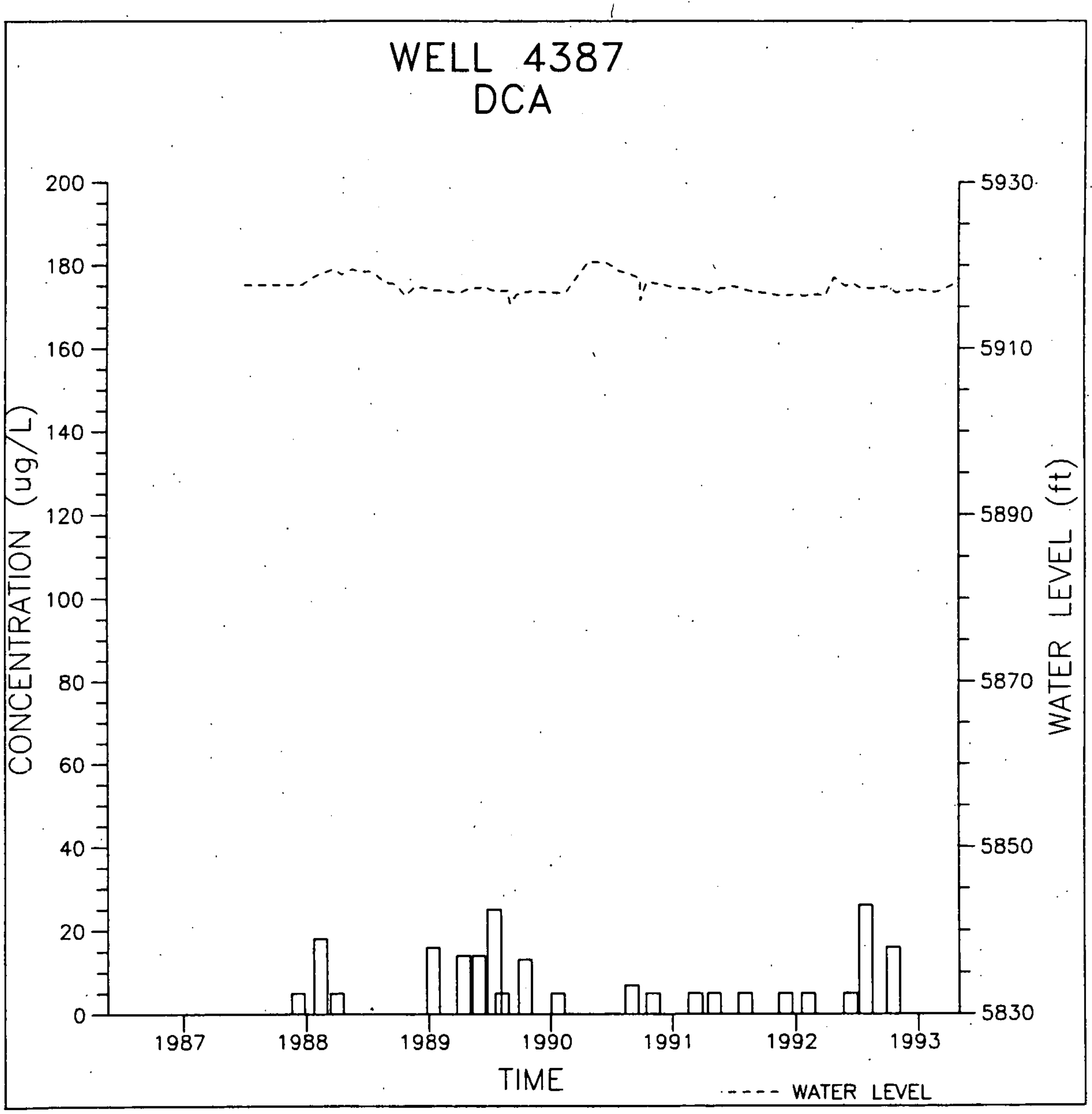
780



WELL 487
DCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

779

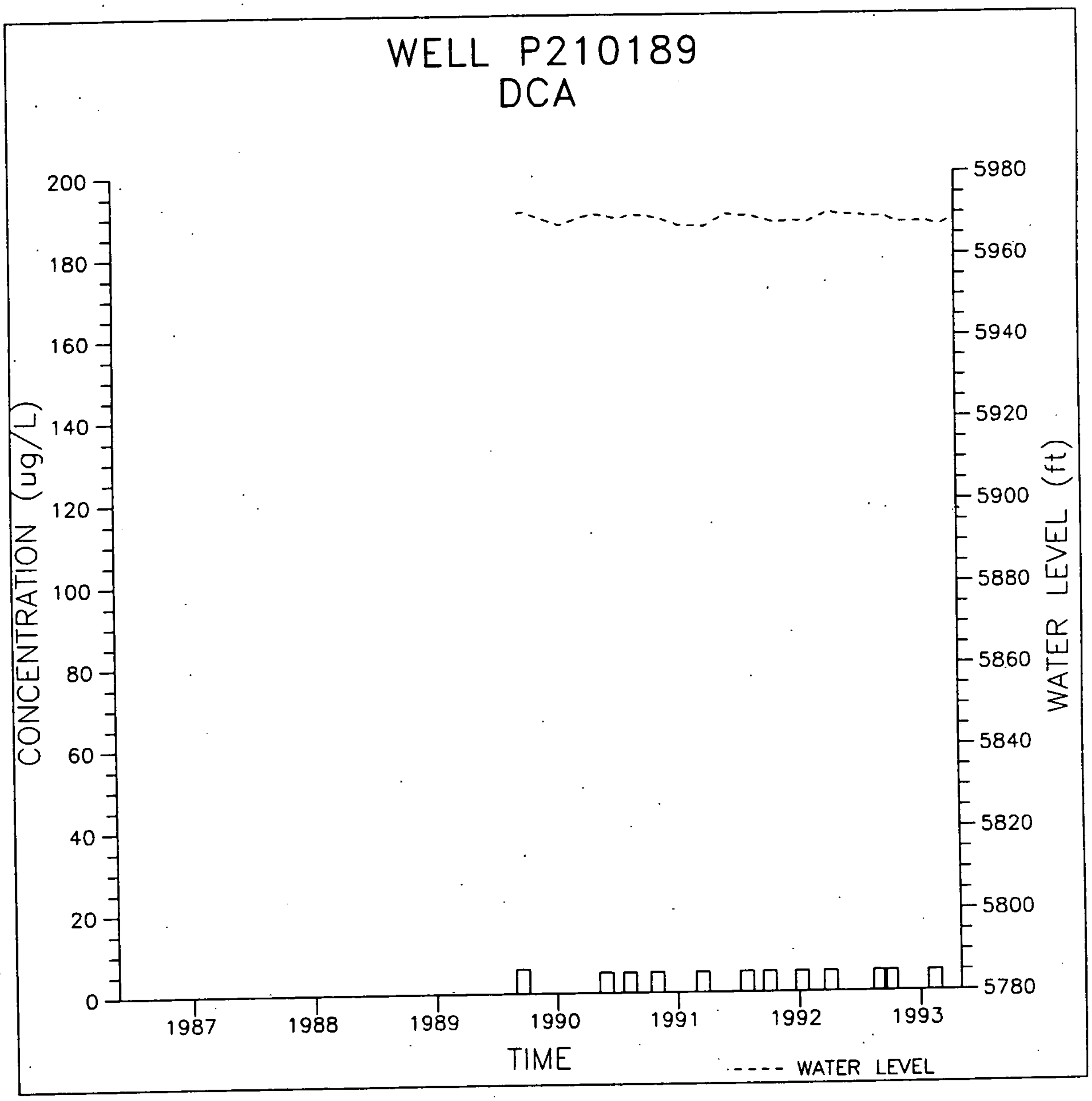
28f



WELL 4387
DCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

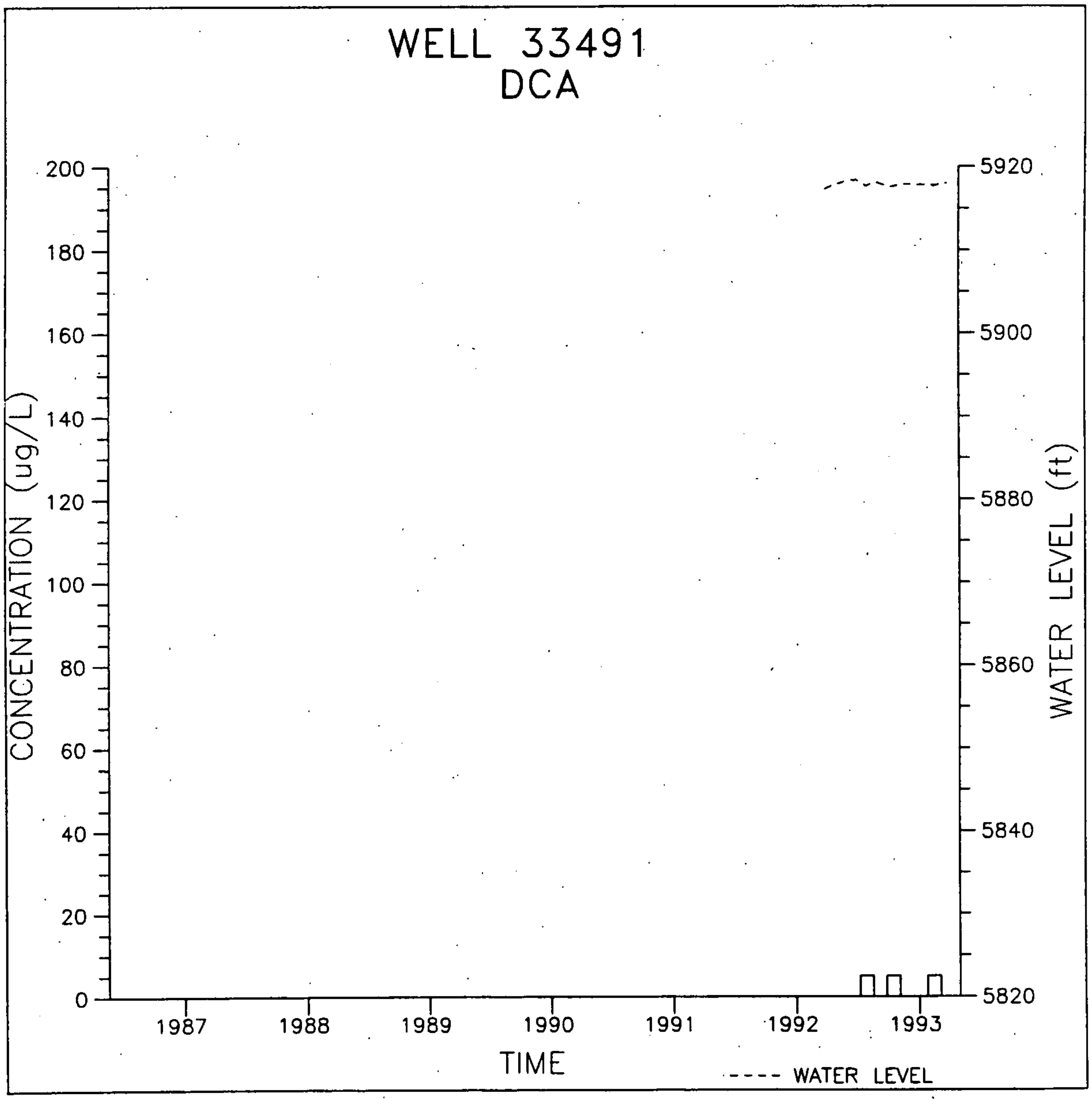
780

788


WELL P210189
DCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

781

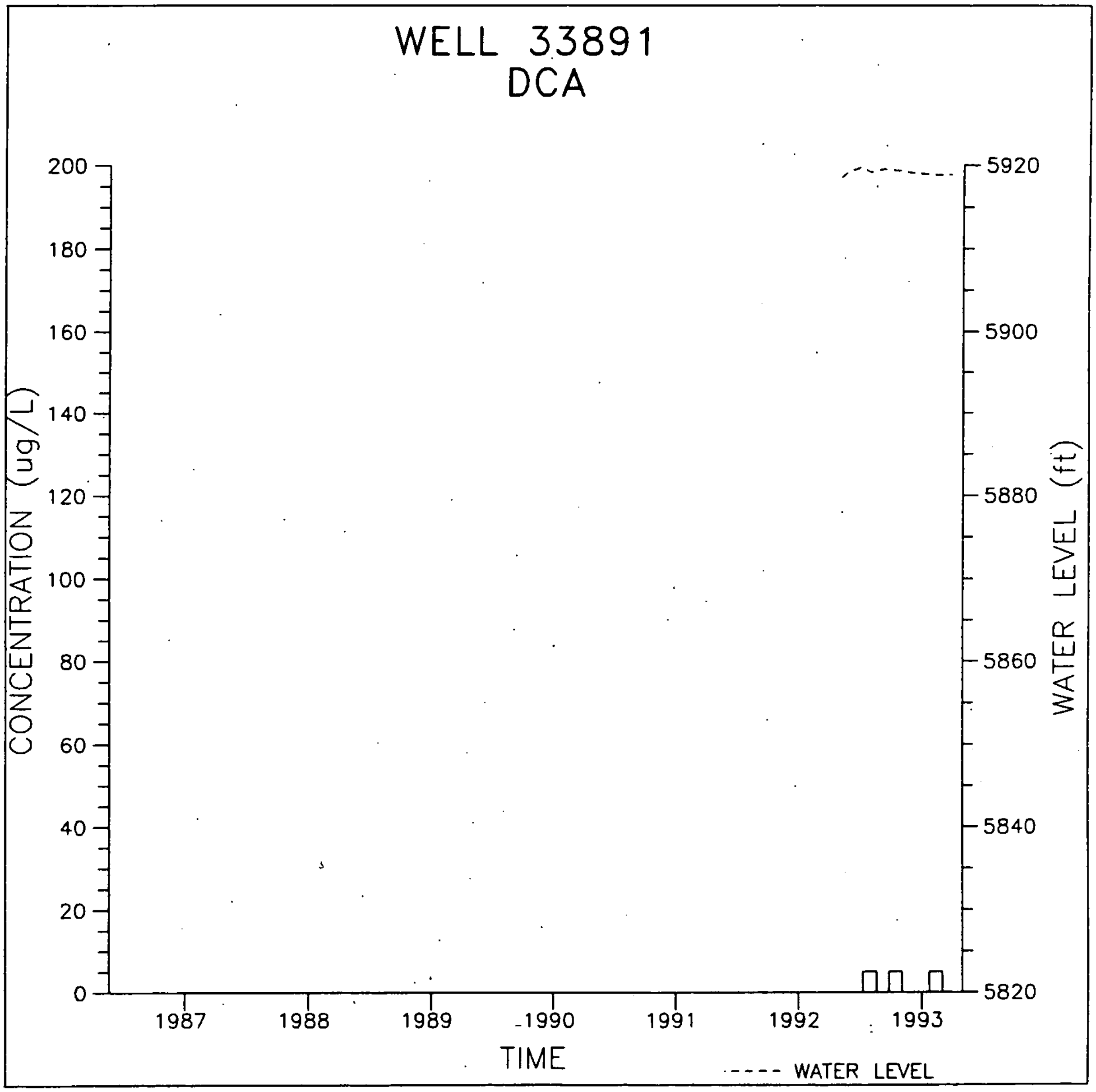
285



WELL 33491
DCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993

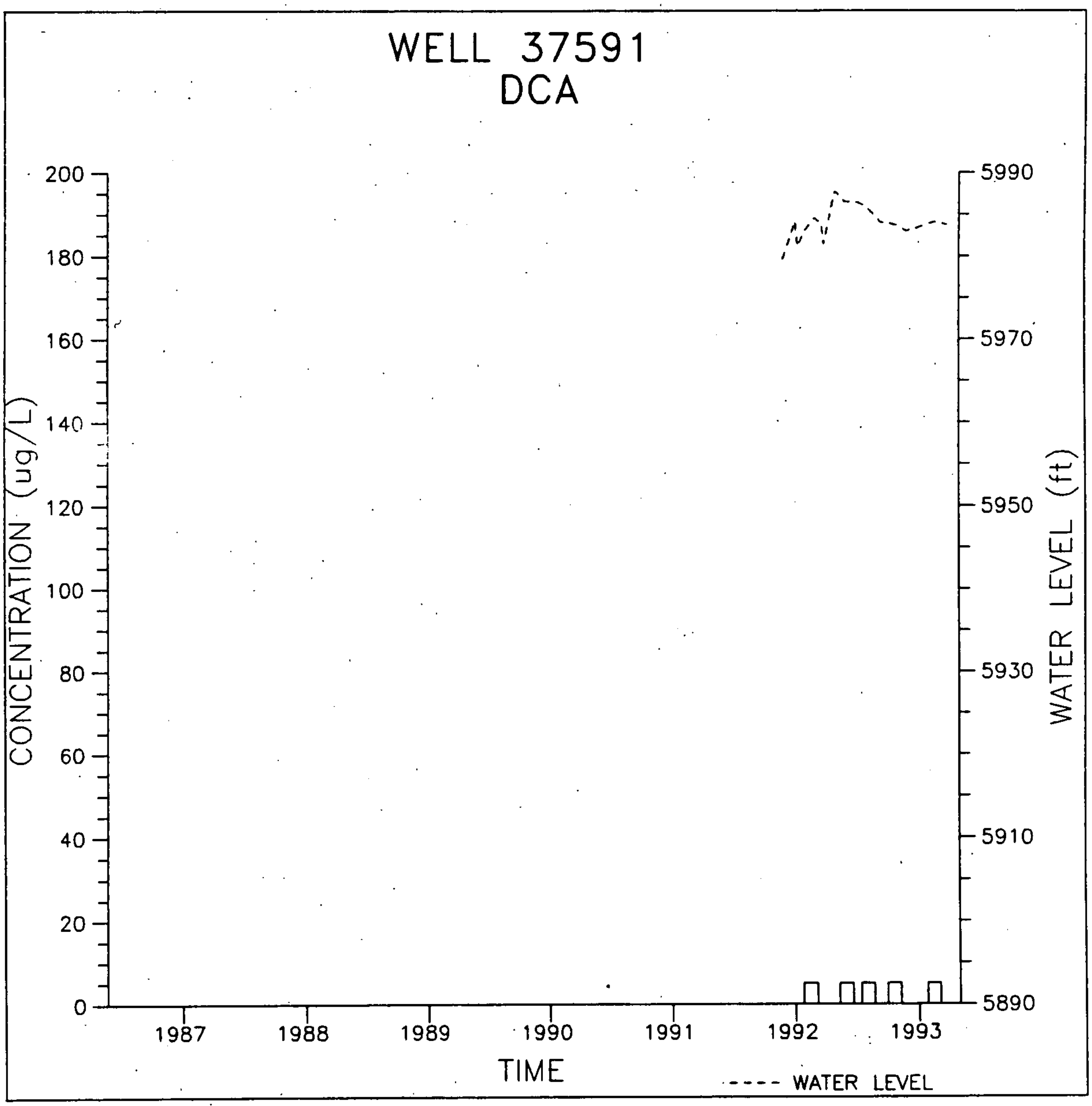
782

784


WELL 33891
DCA
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993

783

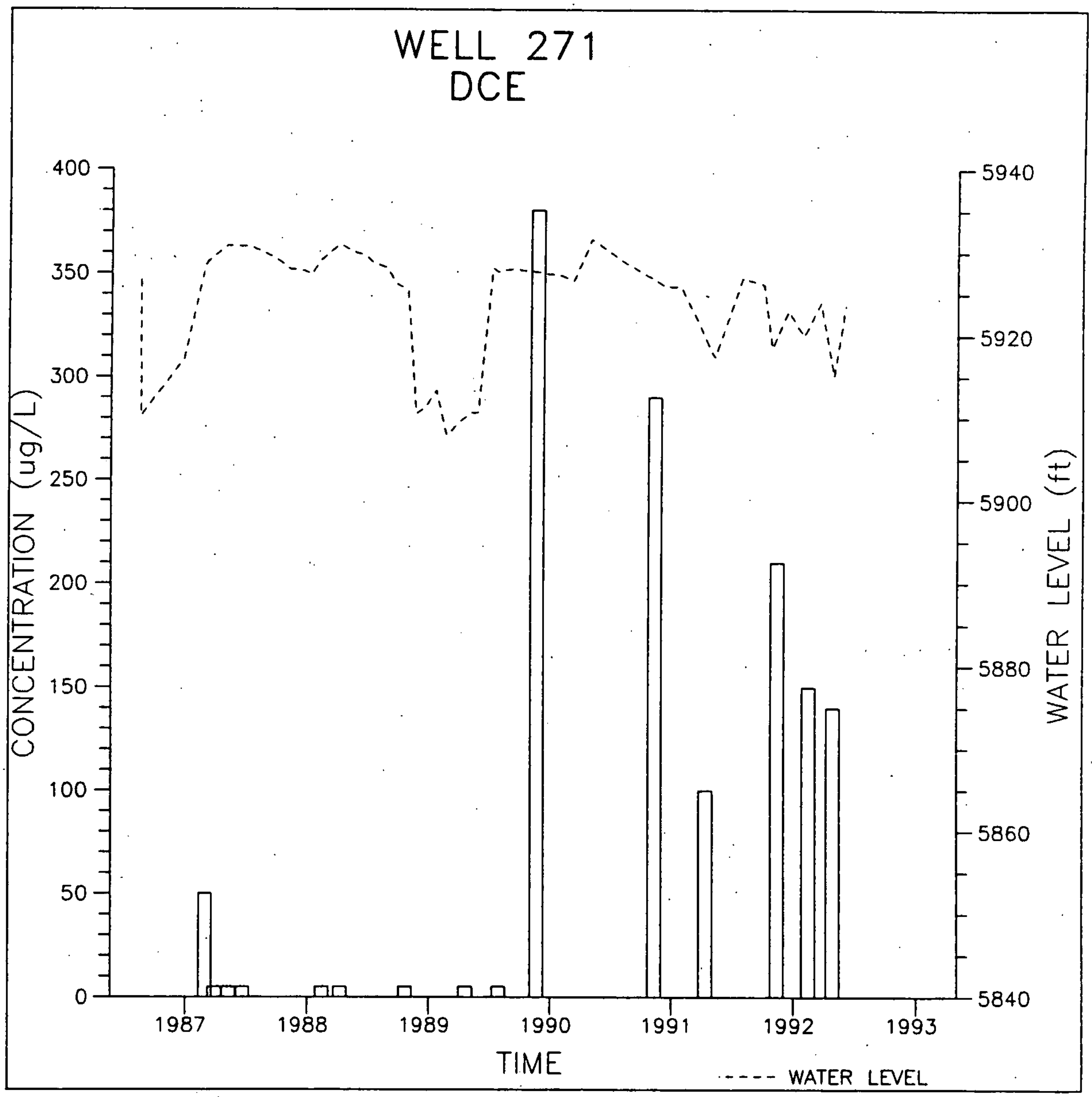
785



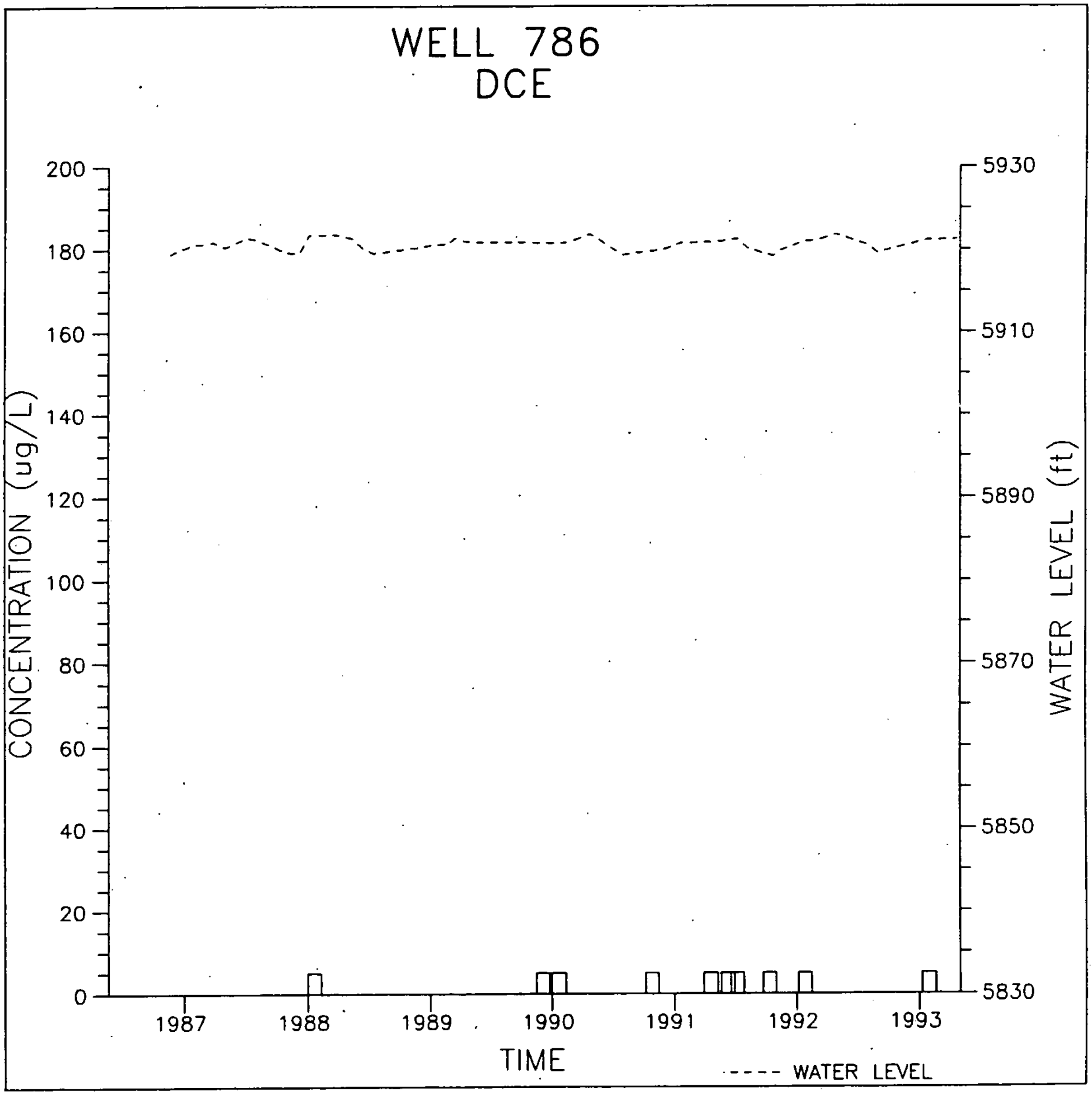
WELL 37591
DCA
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

784

286


WELL 271
DCE
CONCENTRATION (ug/L)
400
350
300
250
200
150
100
50
0
WATER LEVEL (ft)
5940
5920
5900
5880
5860
5840
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

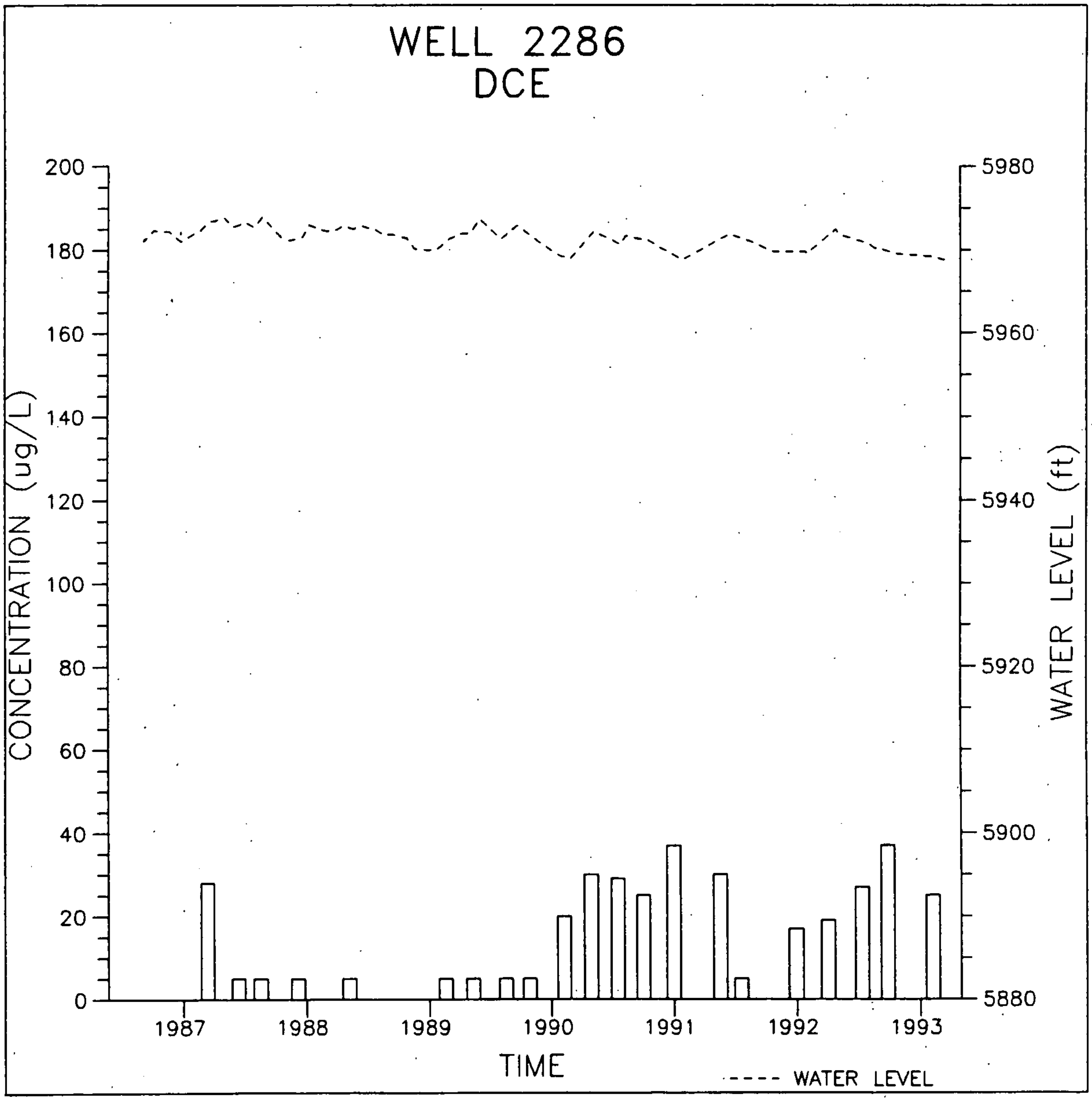
785



WELL 786
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

786

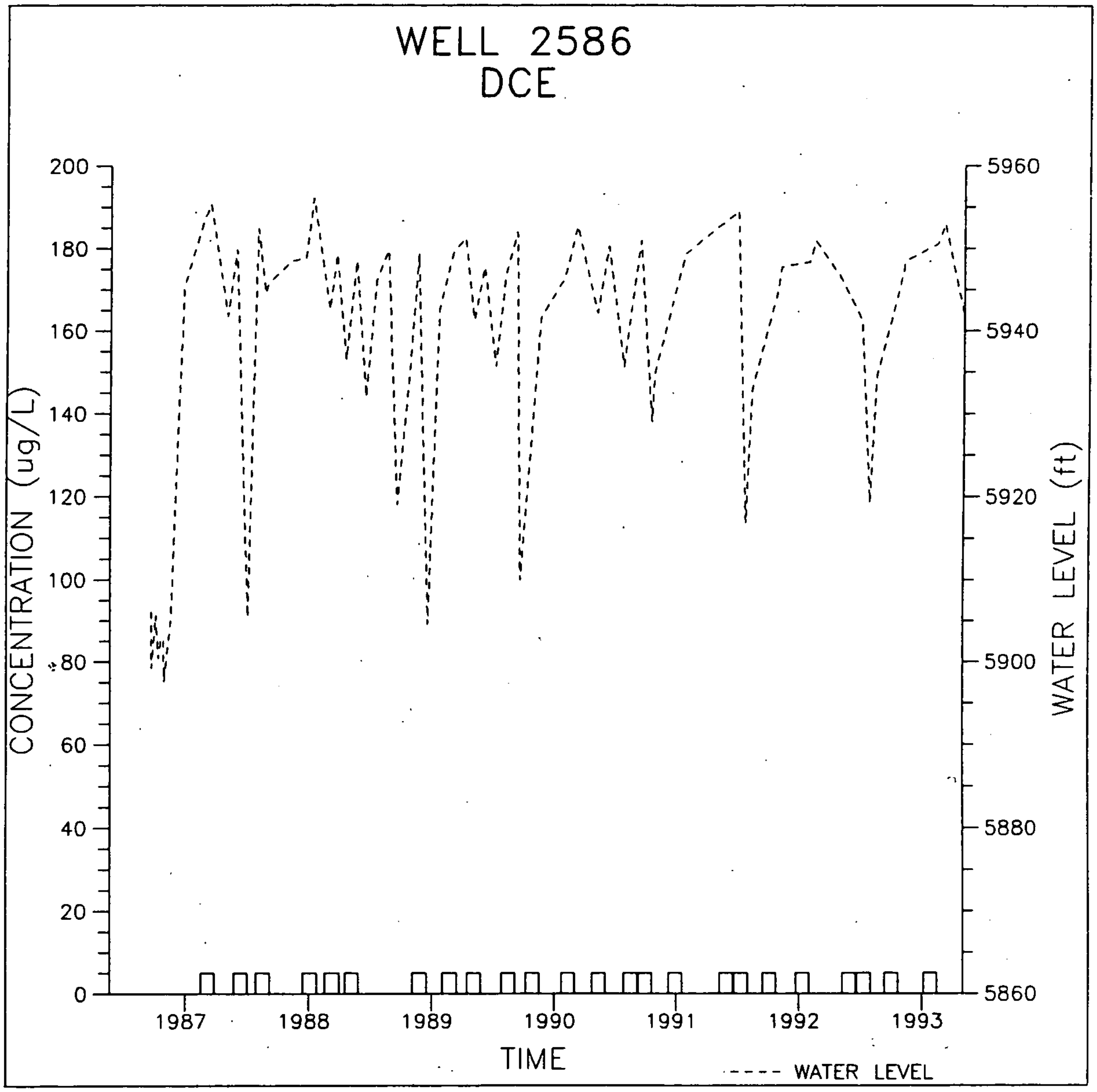
288



WELL 2286
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

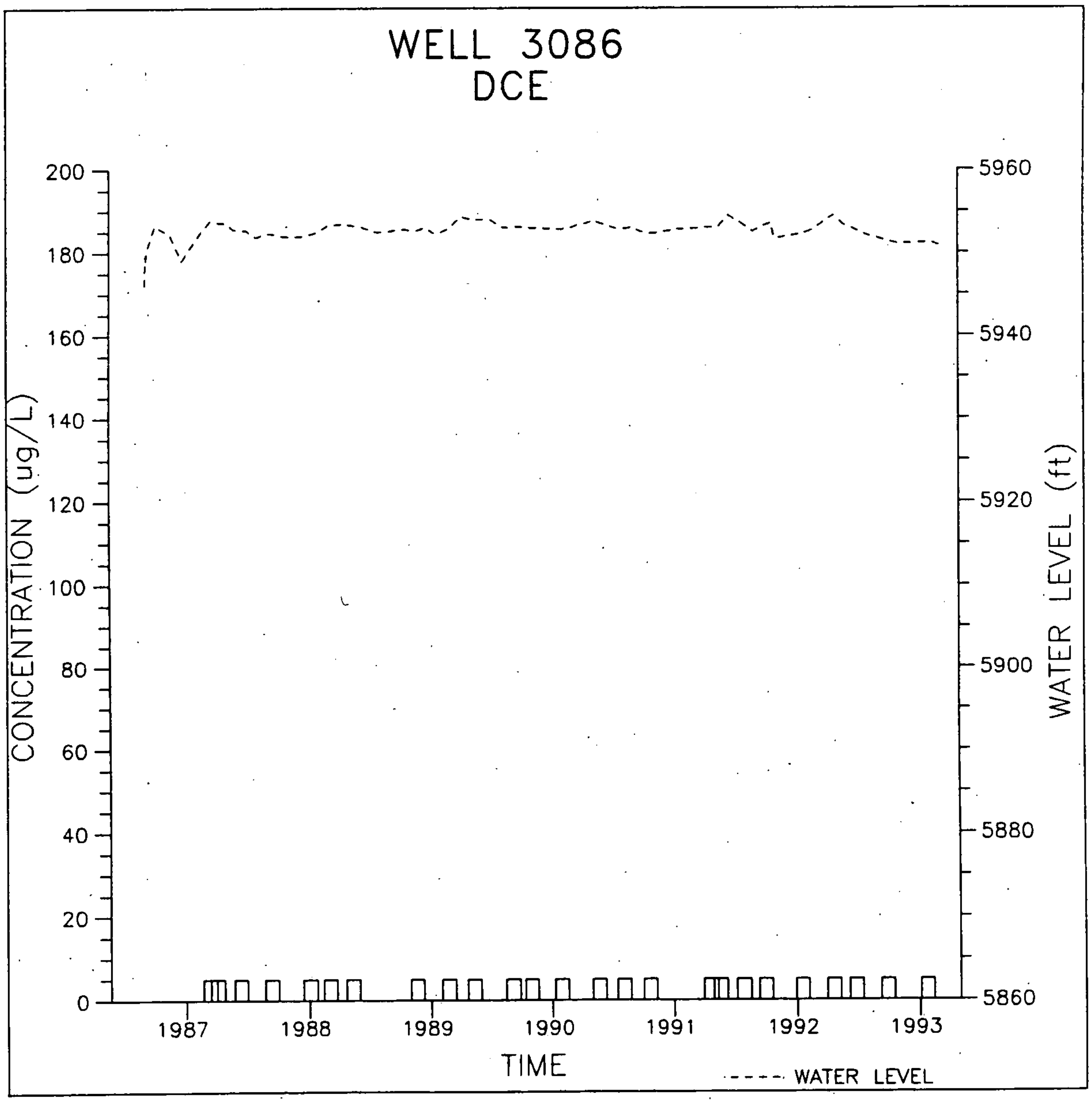
787

788

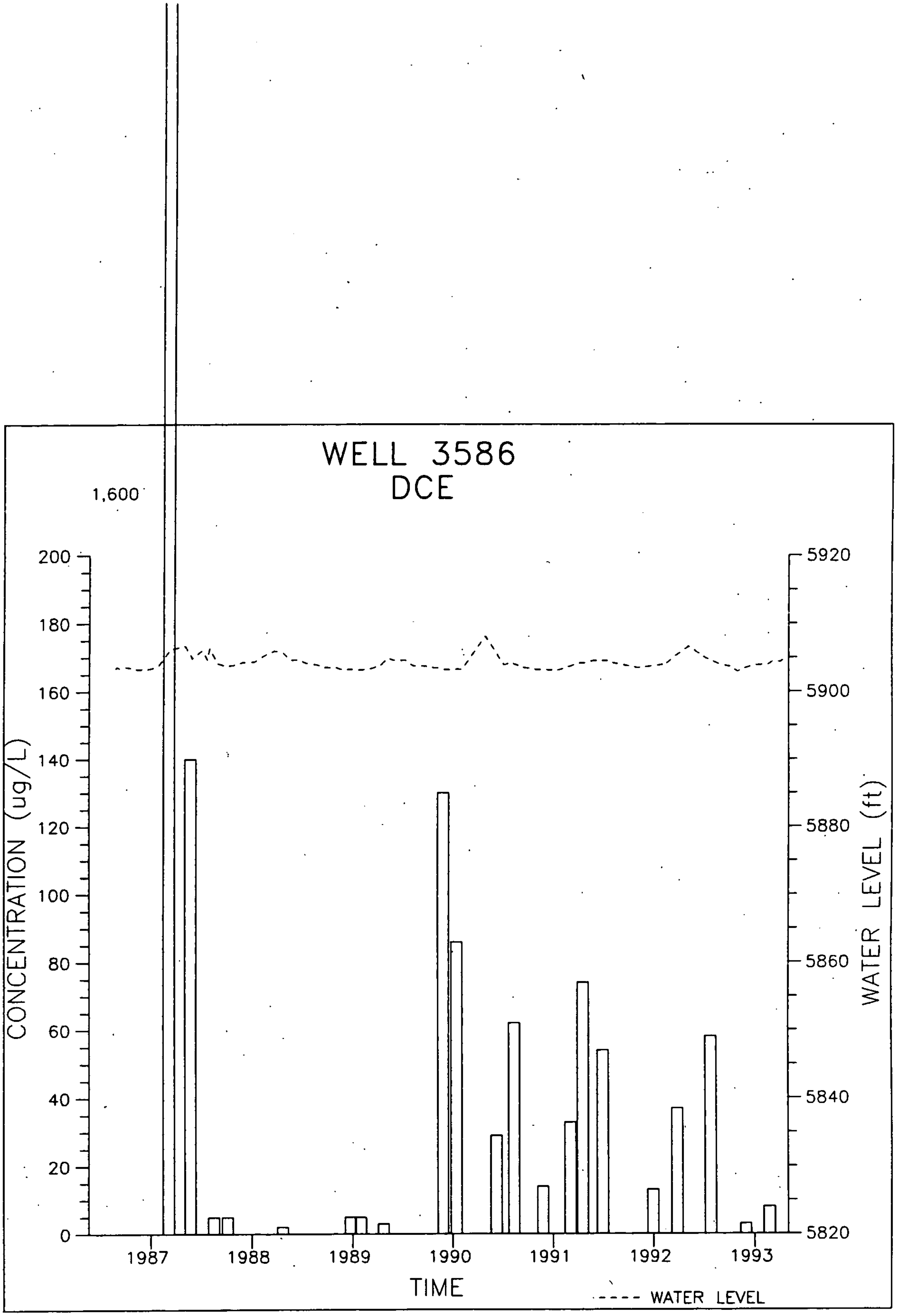


WELL 2586
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

788

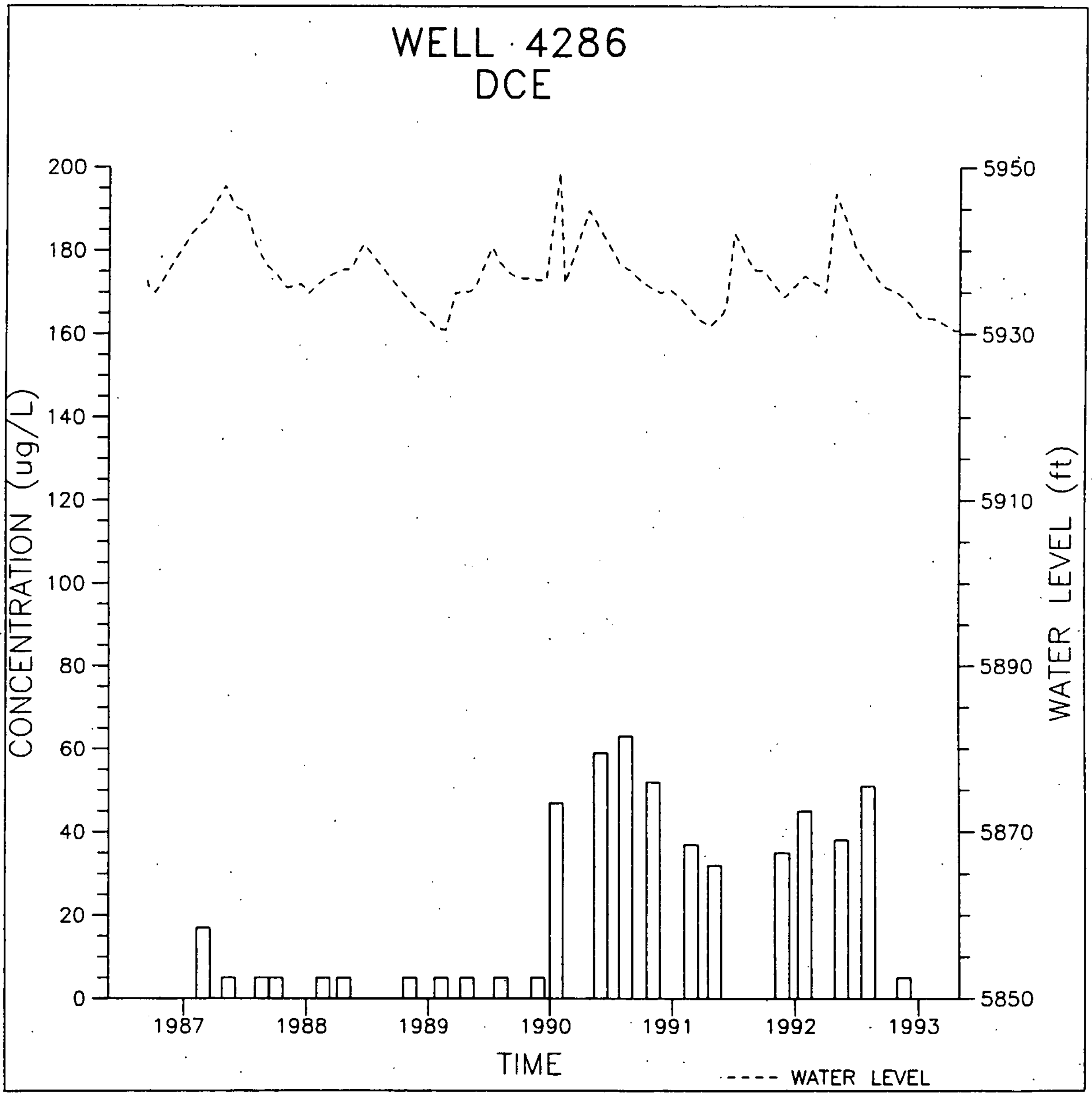

WELL 3086
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

789



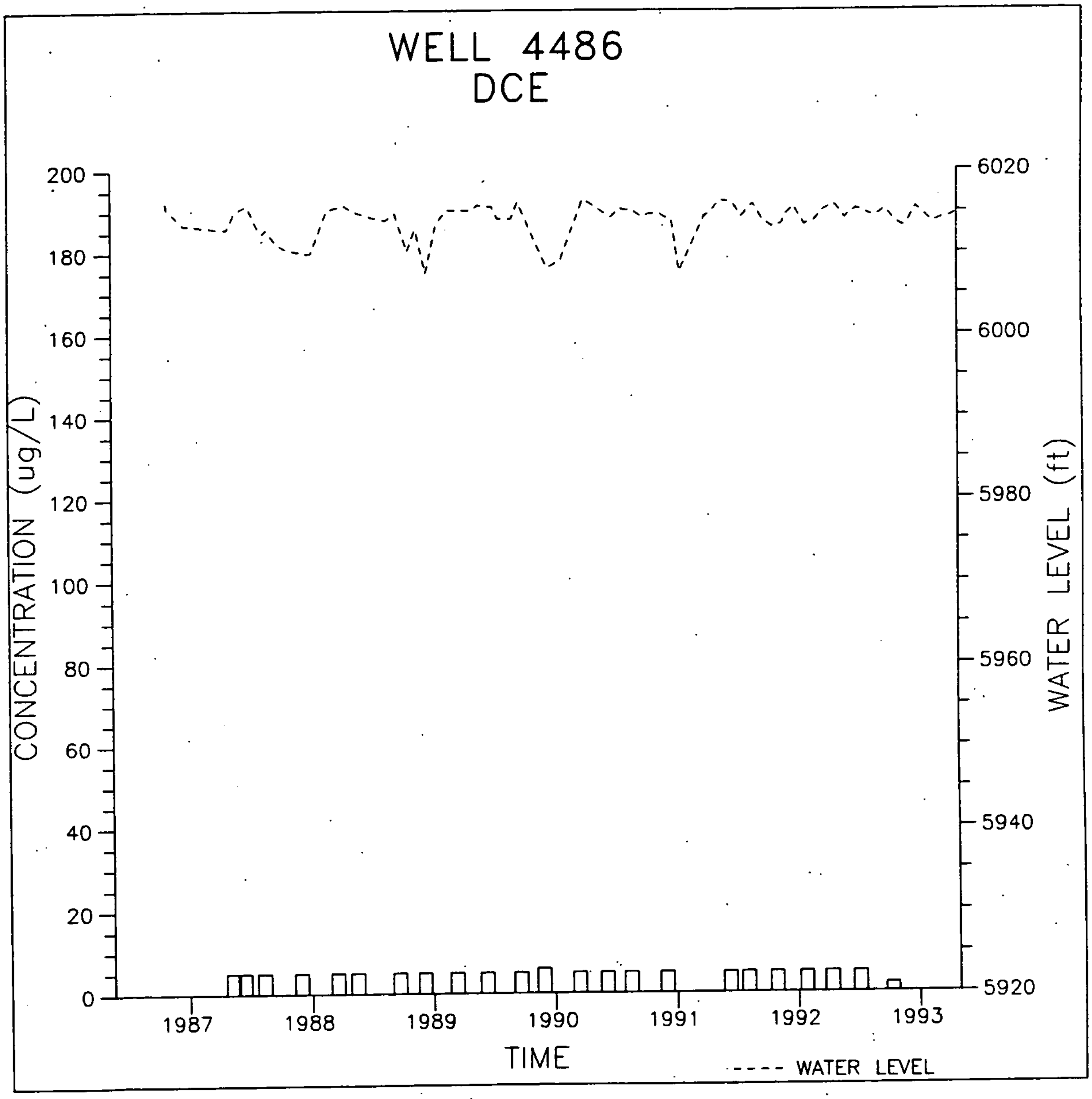
WELL 3586
DCE
1,600
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

790


WELL 4286
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

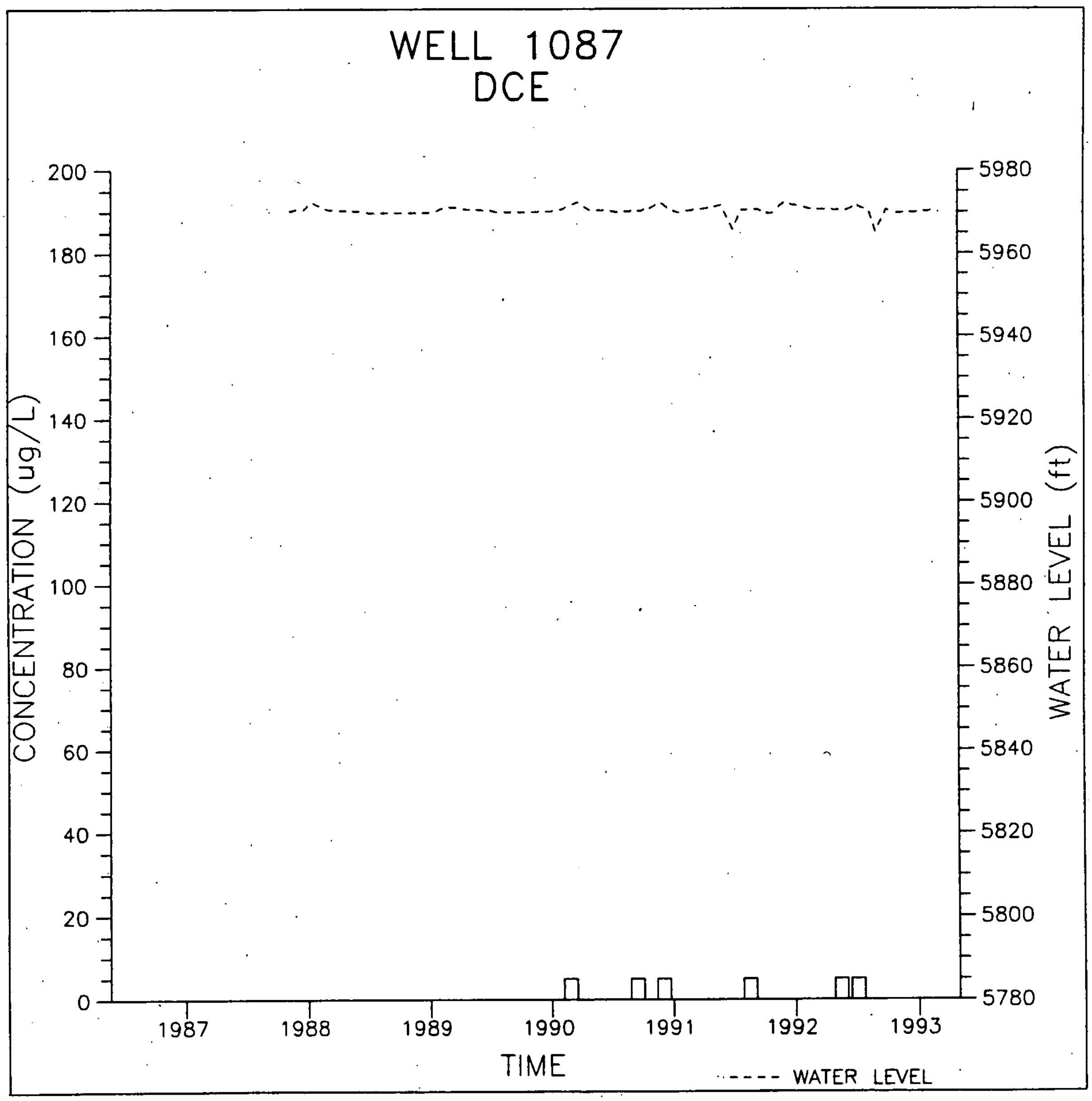
791

1385


WELL 4486
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
6020
6000
5980
5960
5940
5920
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

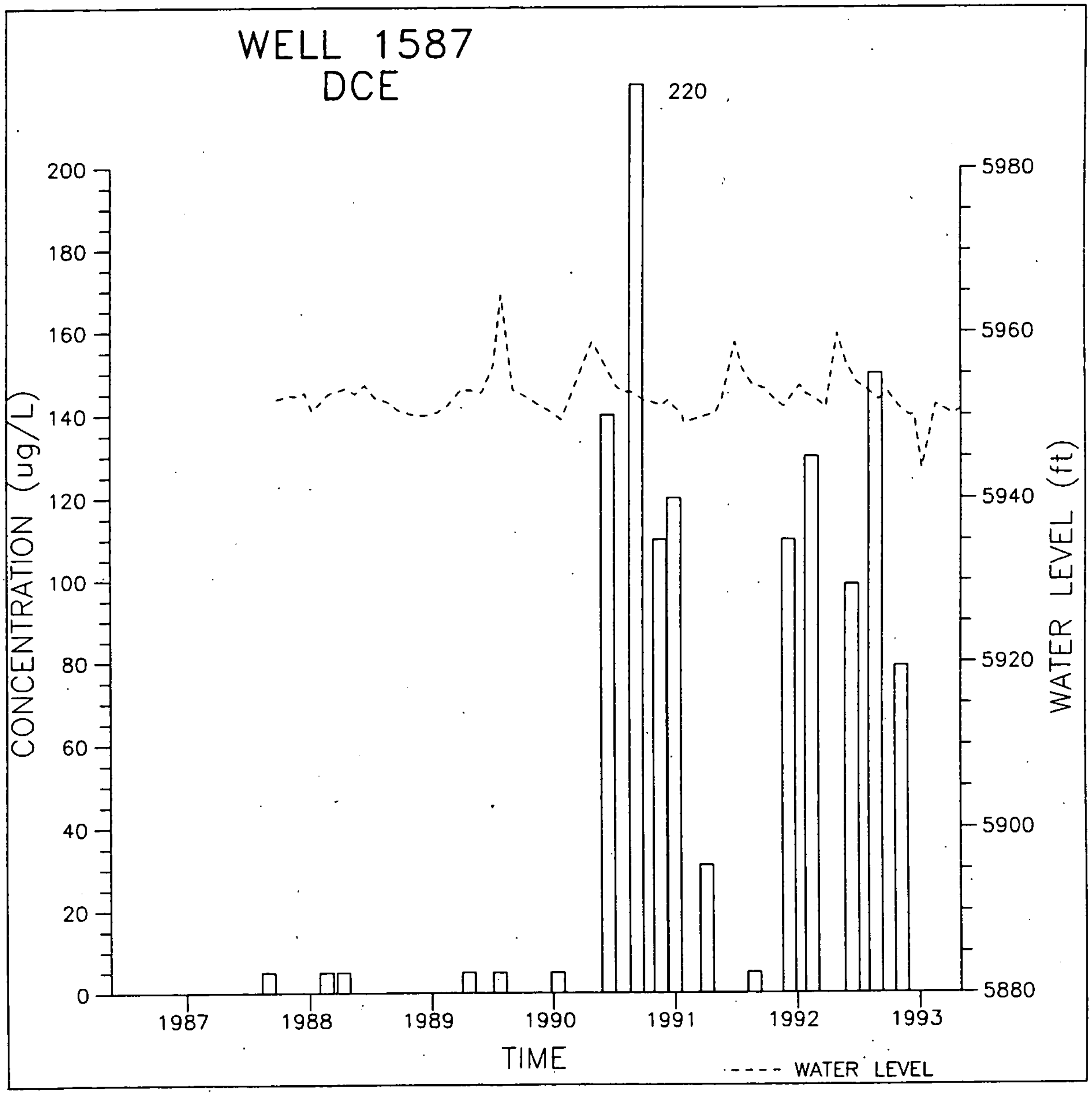
792

794


WELL 1087
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

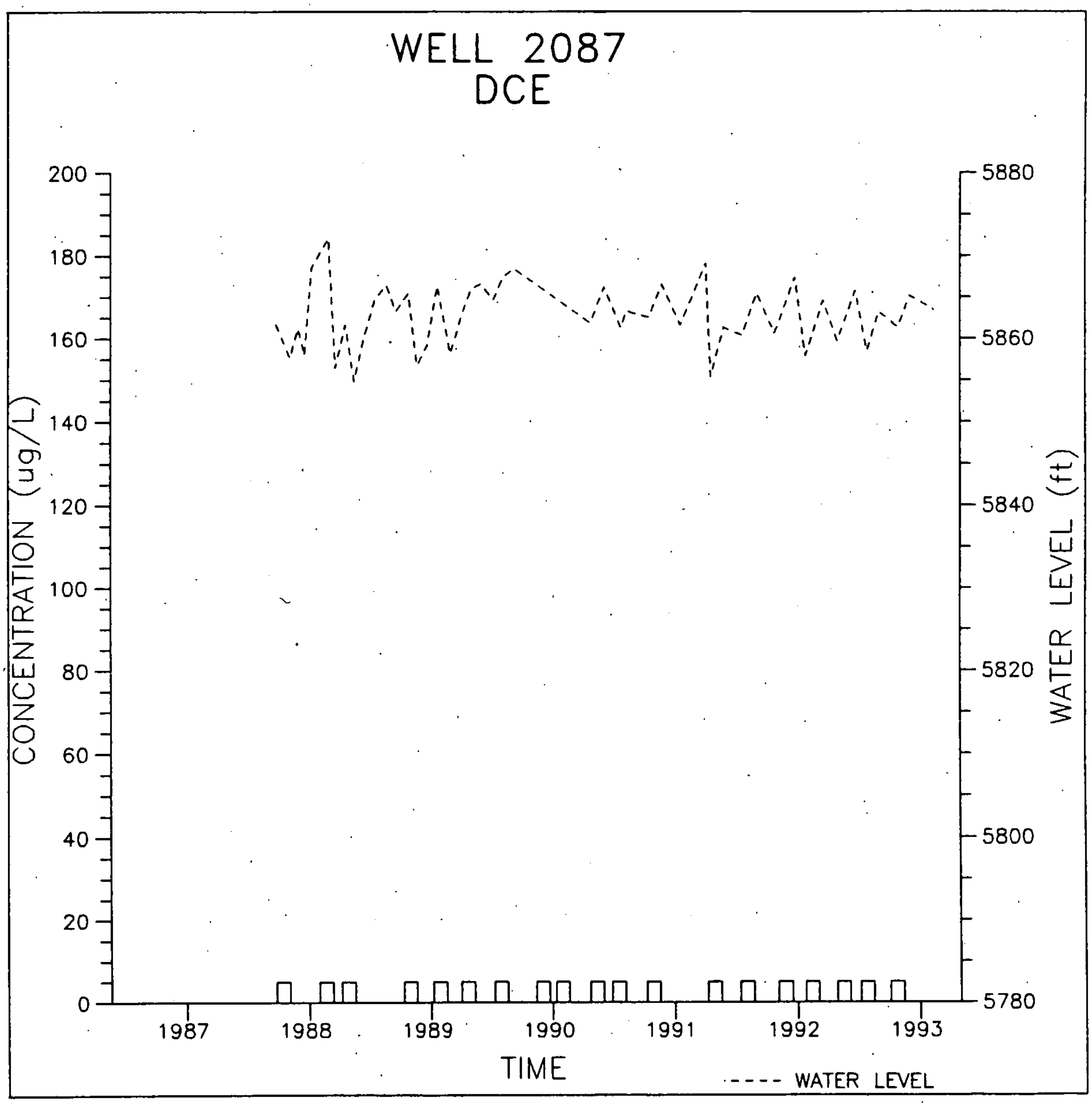
793

785



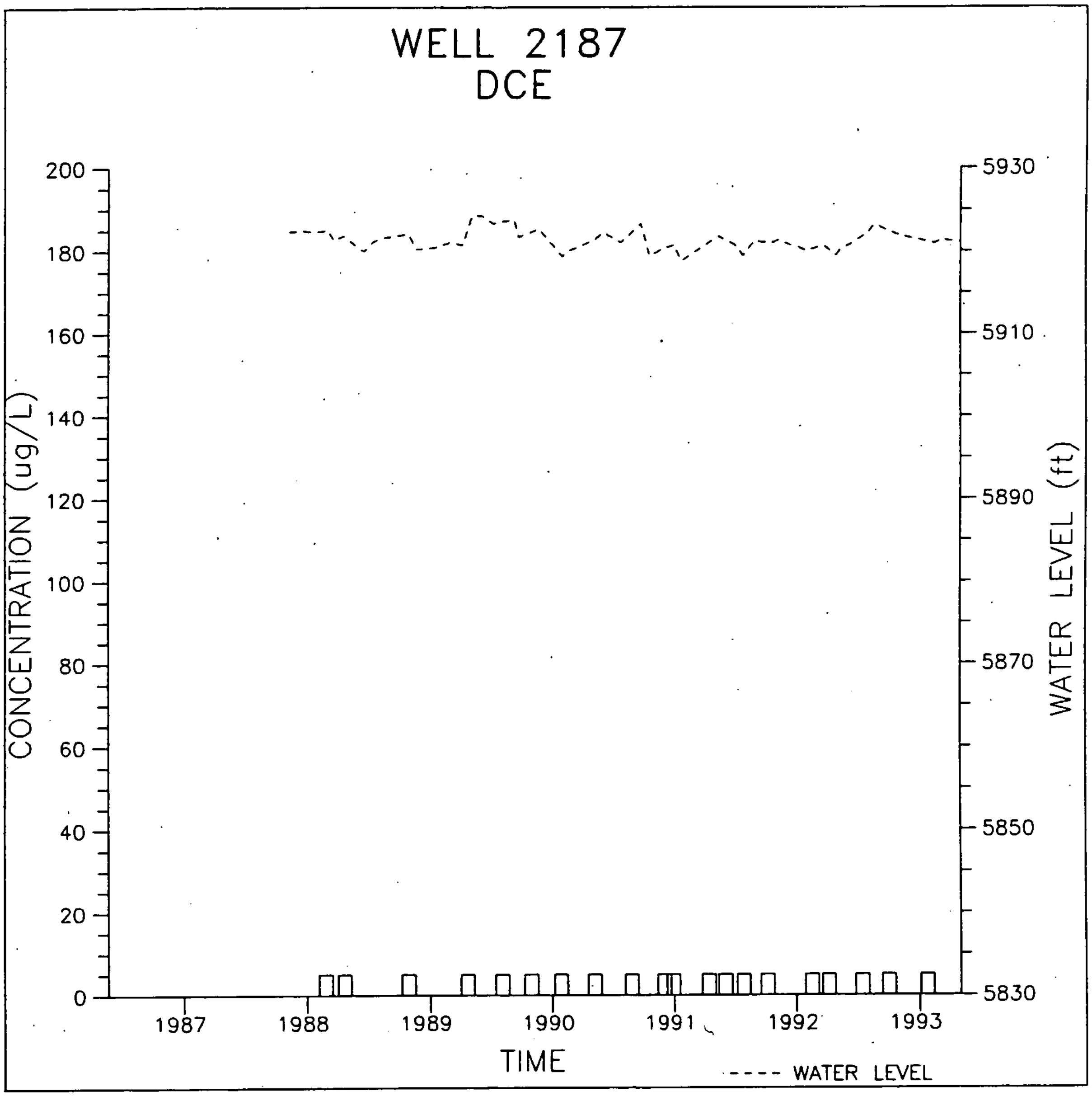
WELL 1587
DCE
220
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

794



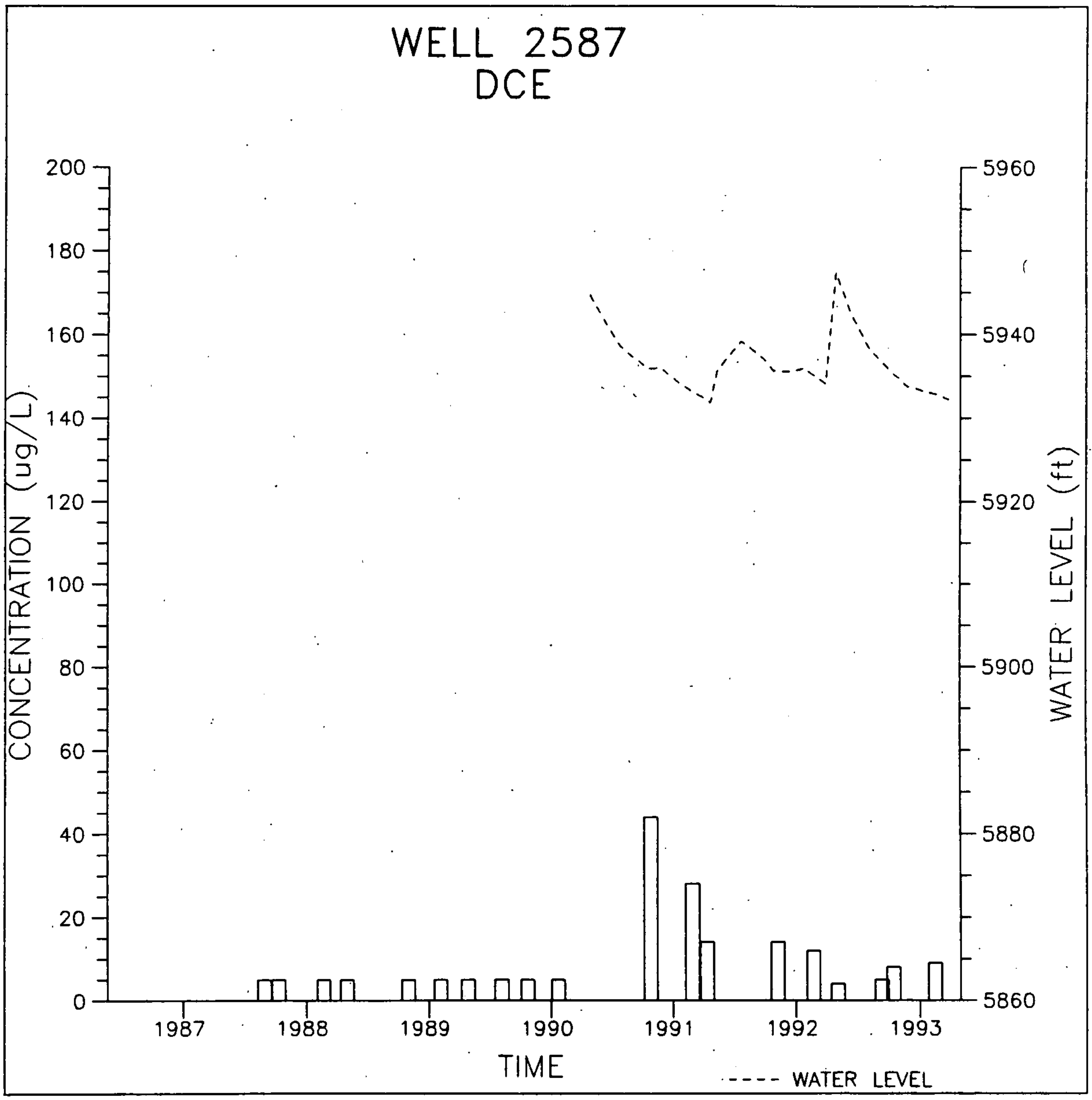
WELL 2087
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

795



WELL 2187
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

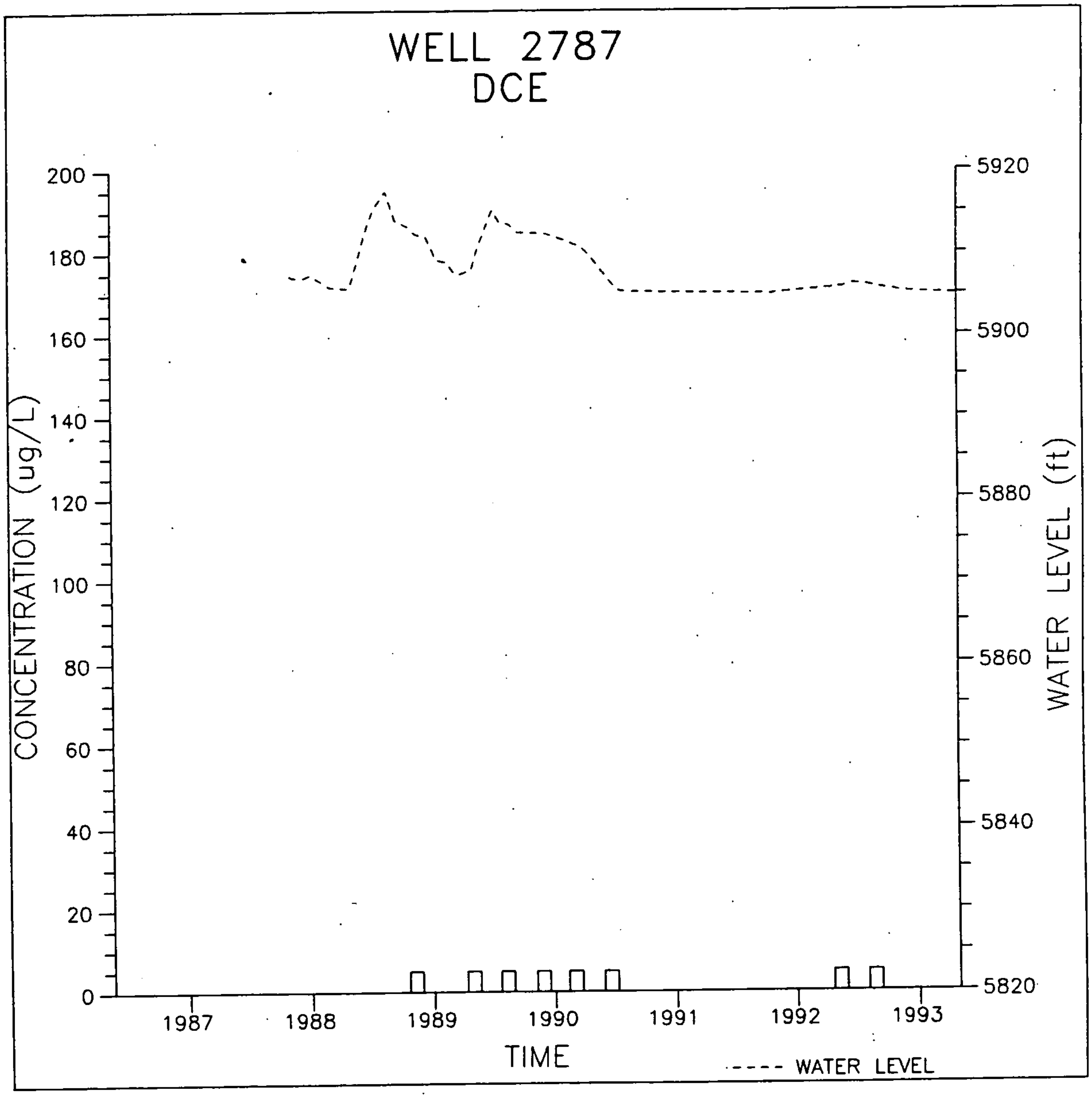
796



WELL 2587
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

797

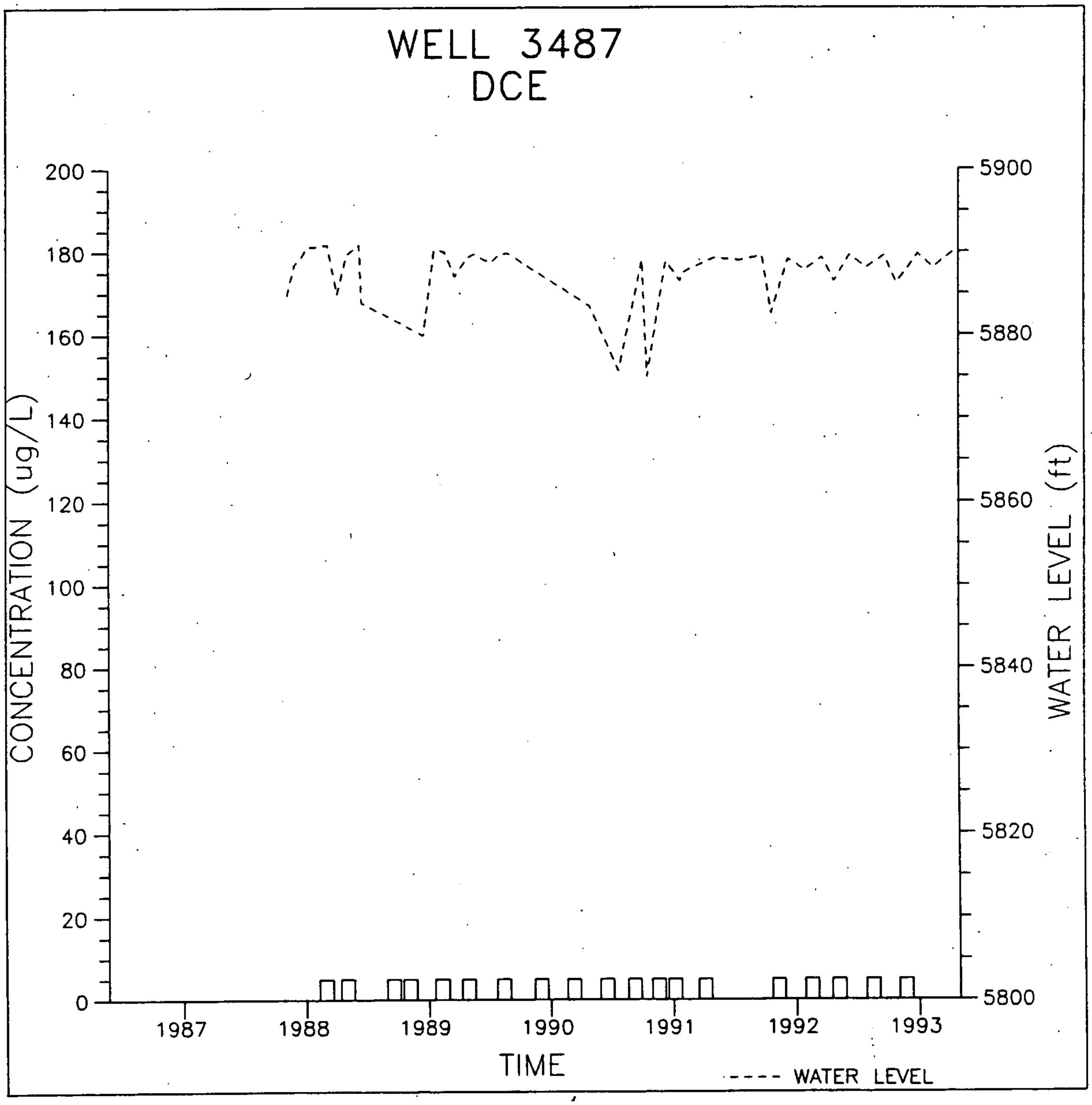
789



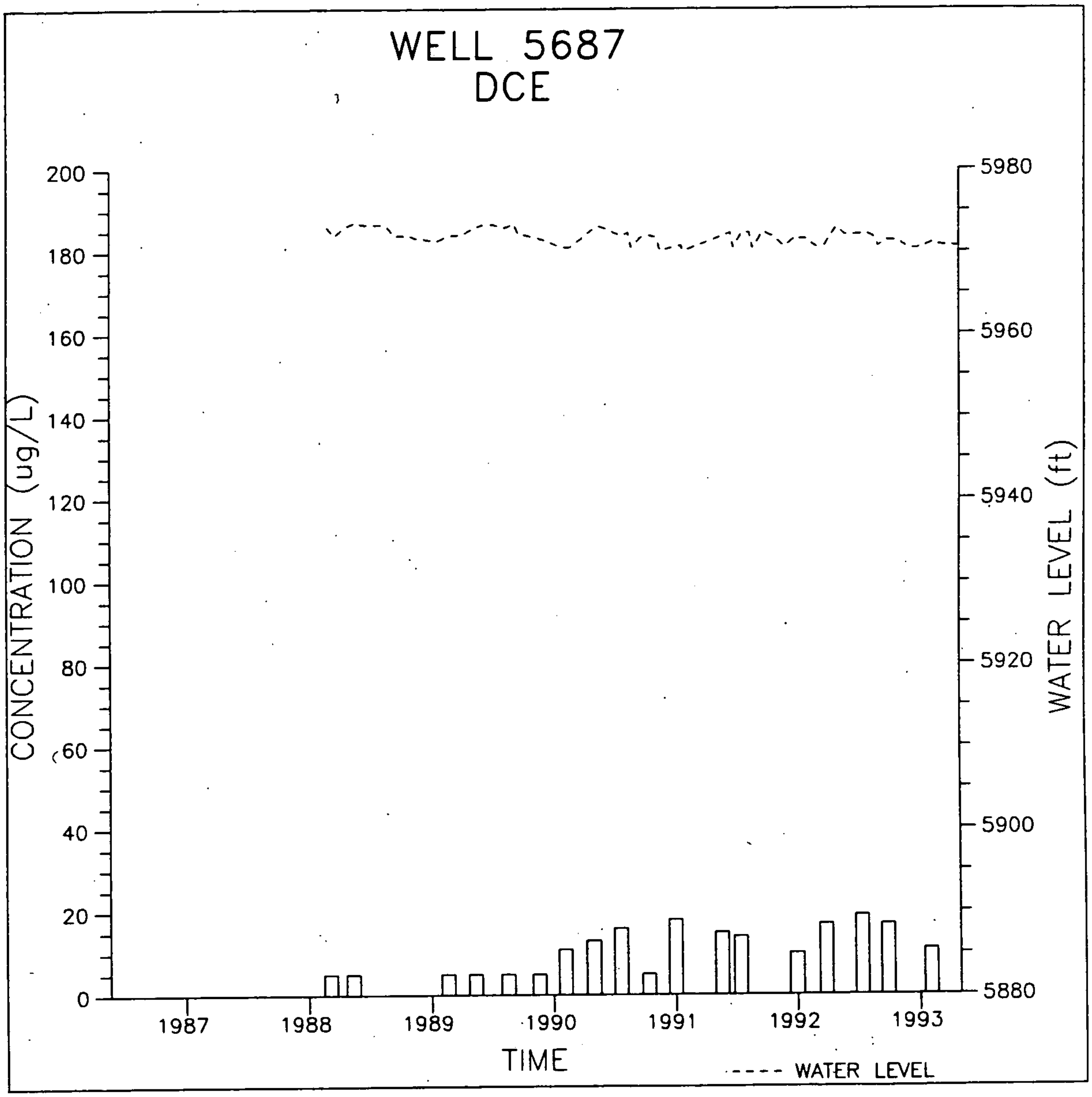
WELL 2787
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

798

800


WELL 3487
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

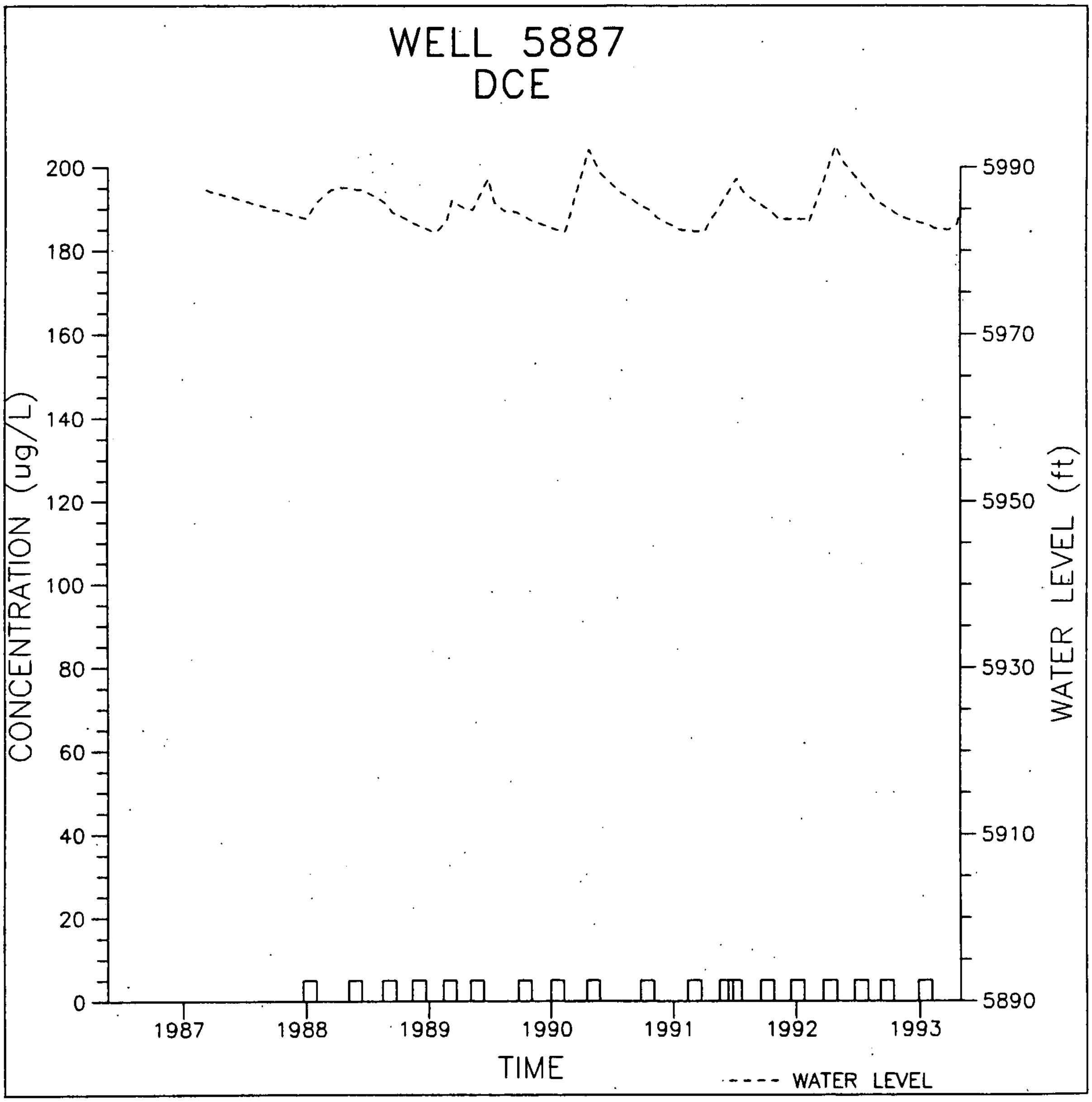
799



WELL 5687
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

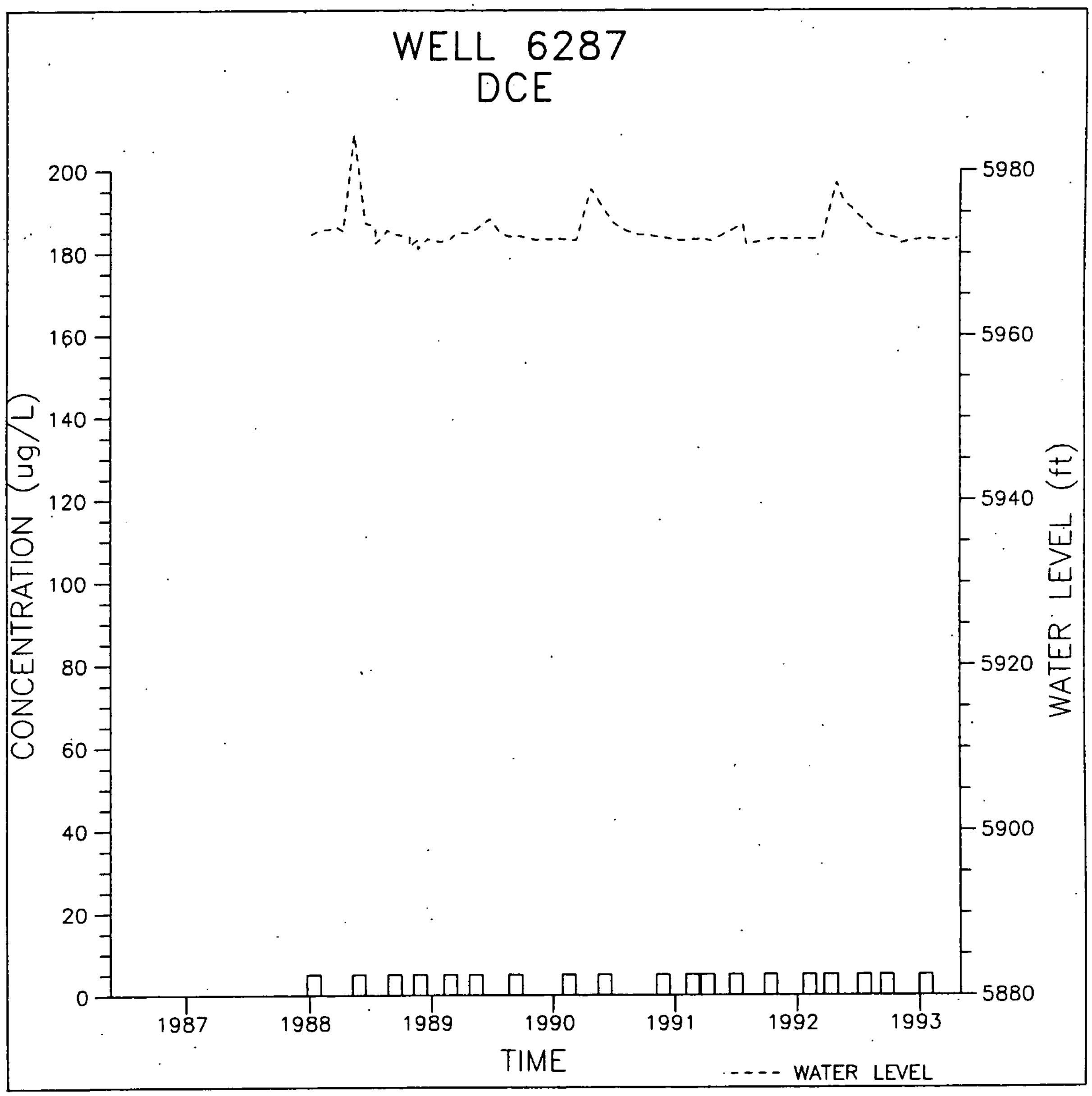
800

808


WELL 5887
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5890
5910
5930
5950
5970
5990
1987
1988
1989
1990
1991
1992
1993

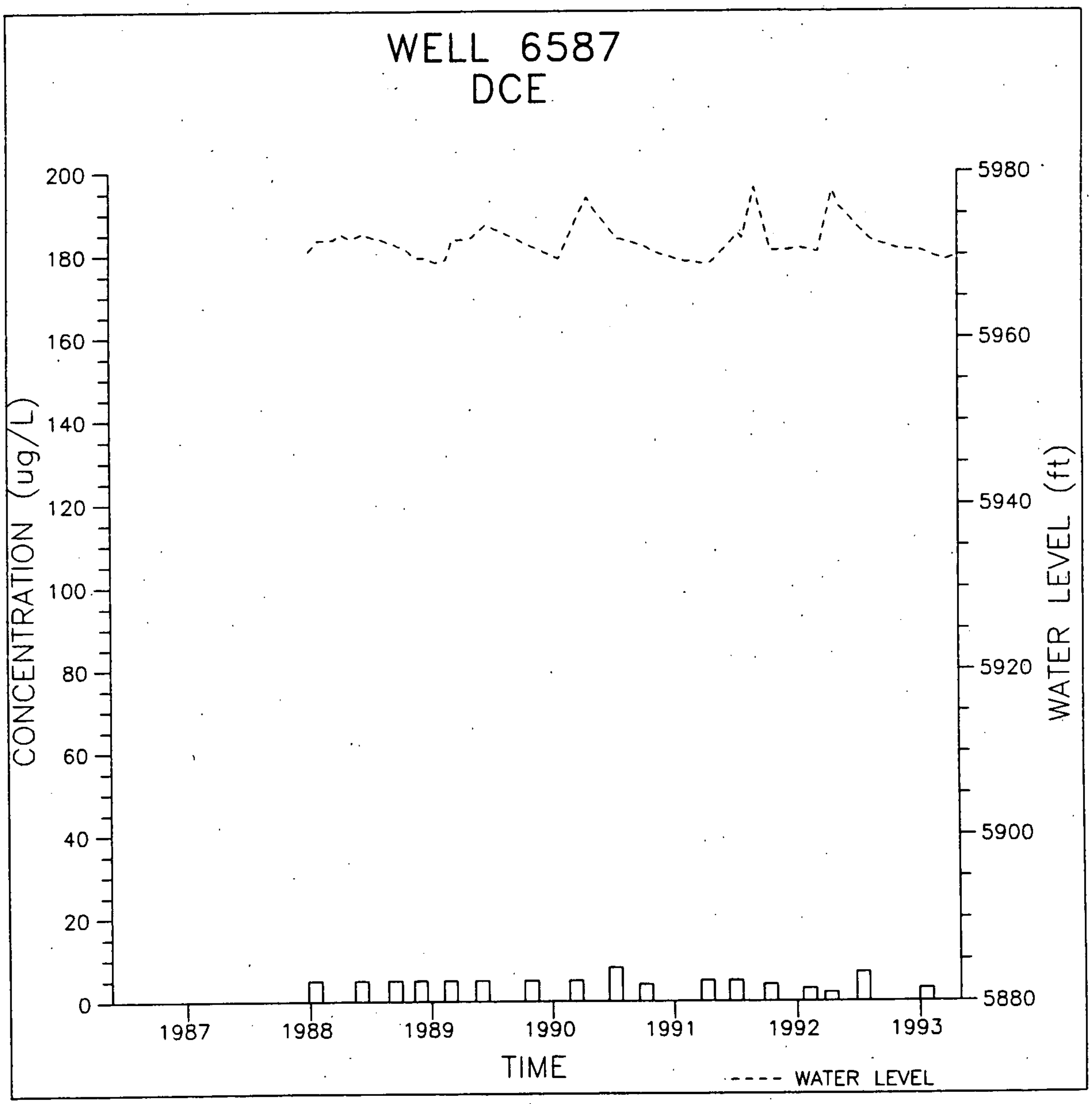
801

805

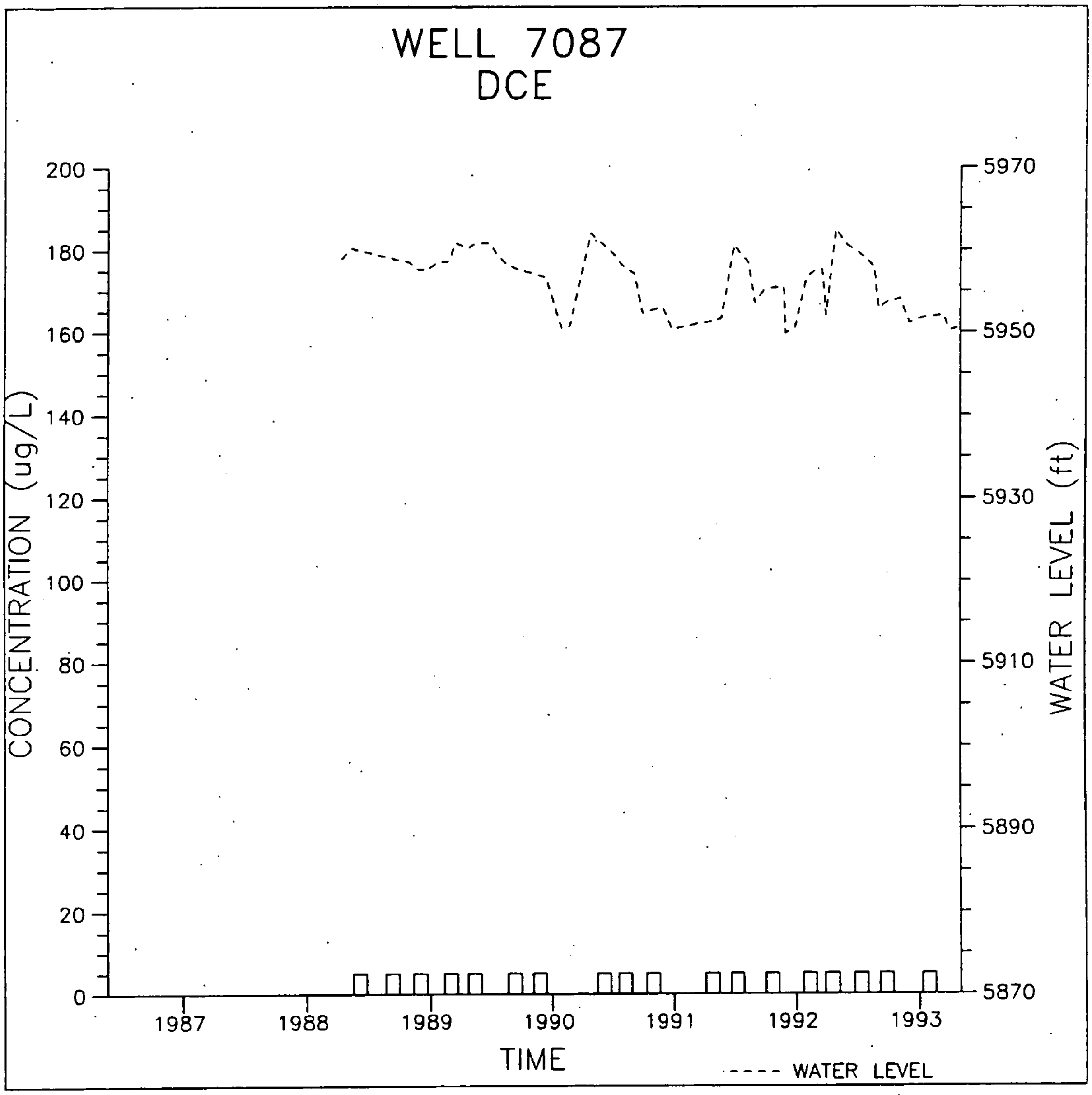


WELL 6287
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

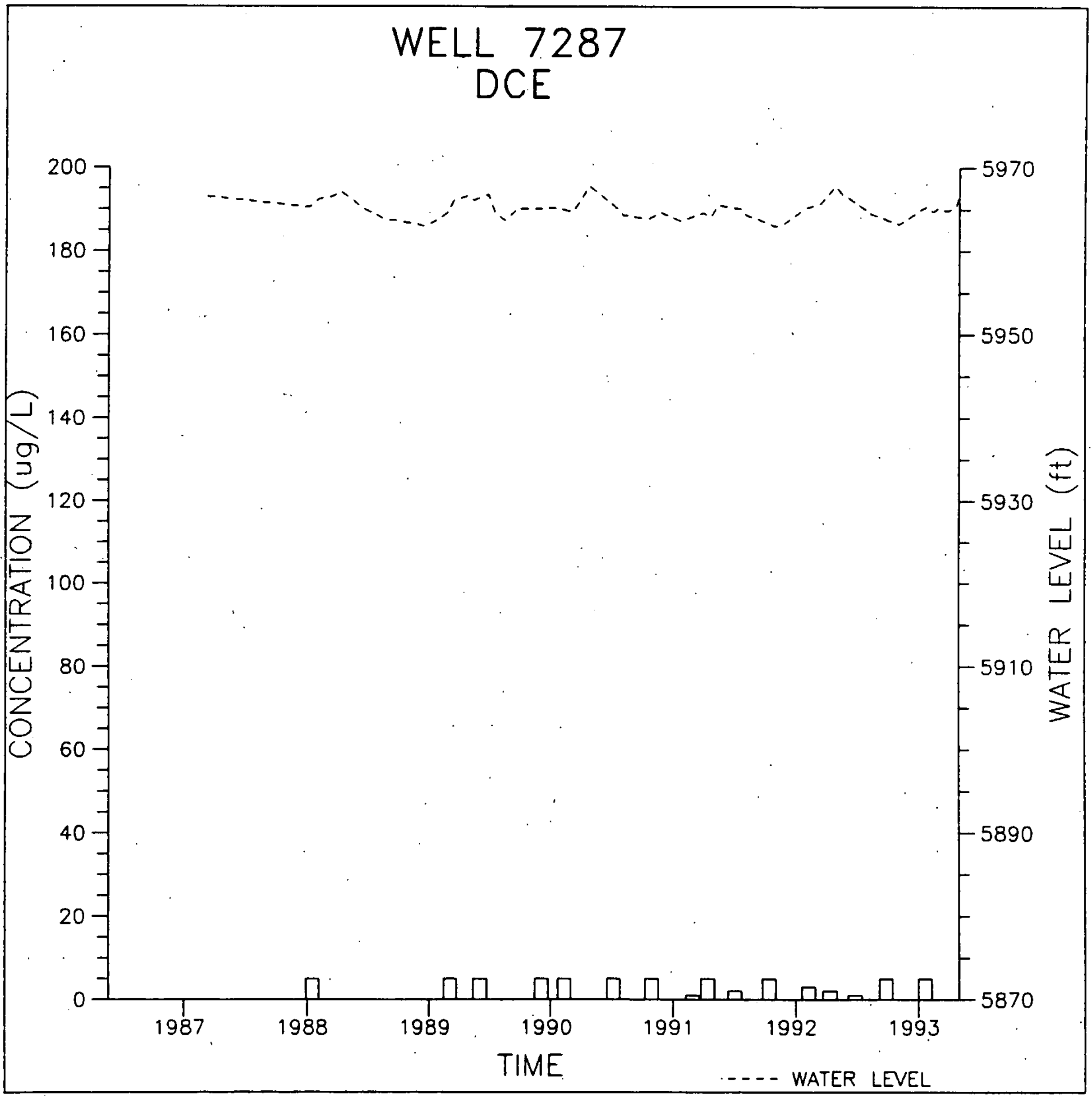
802


WELL 6587
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

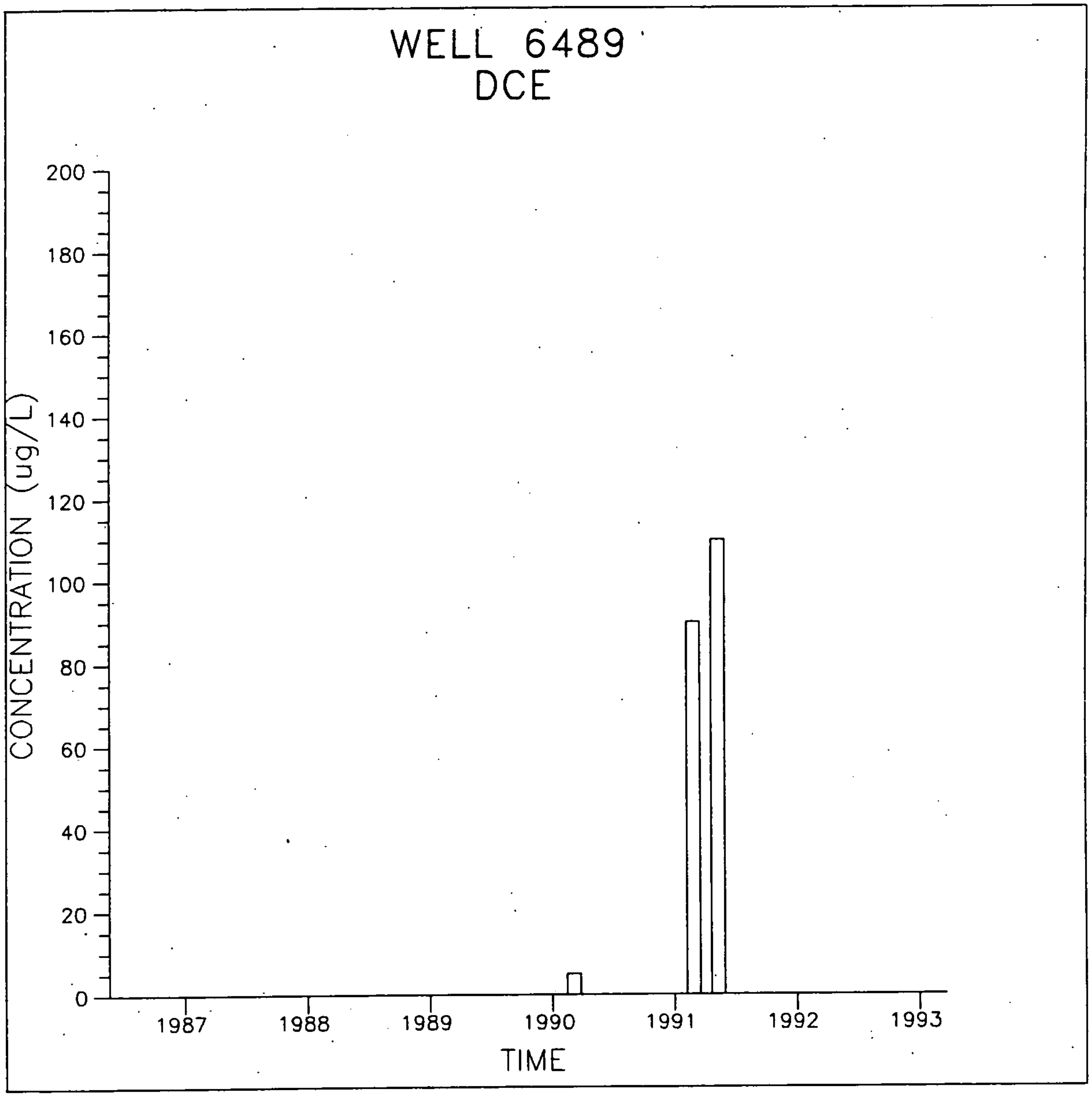
803


WELL 7087
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
5970
5950
5930
5910
5890
5870
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

804

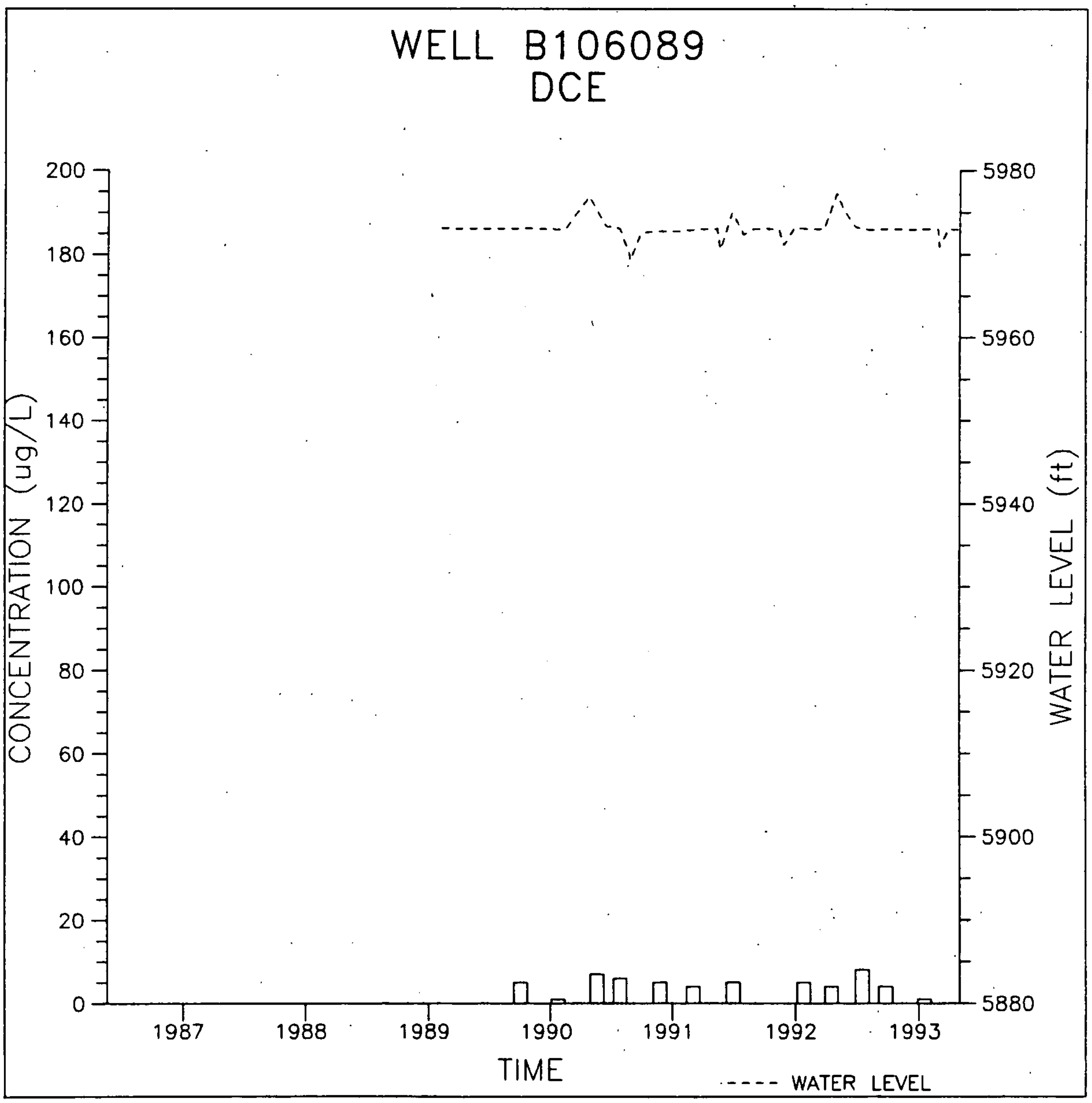

WELL 7287
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

805

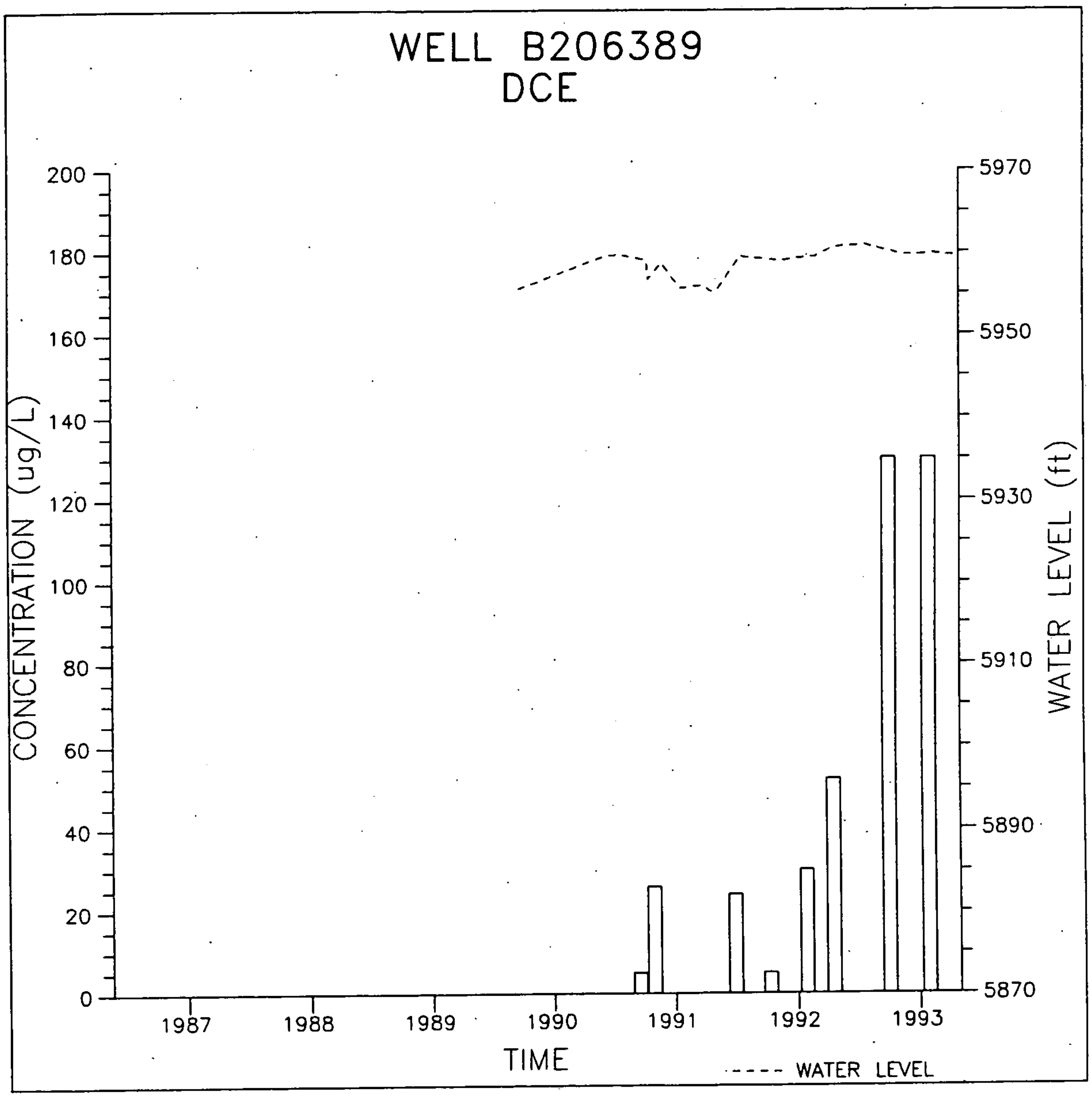

WELL 6489
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME

806

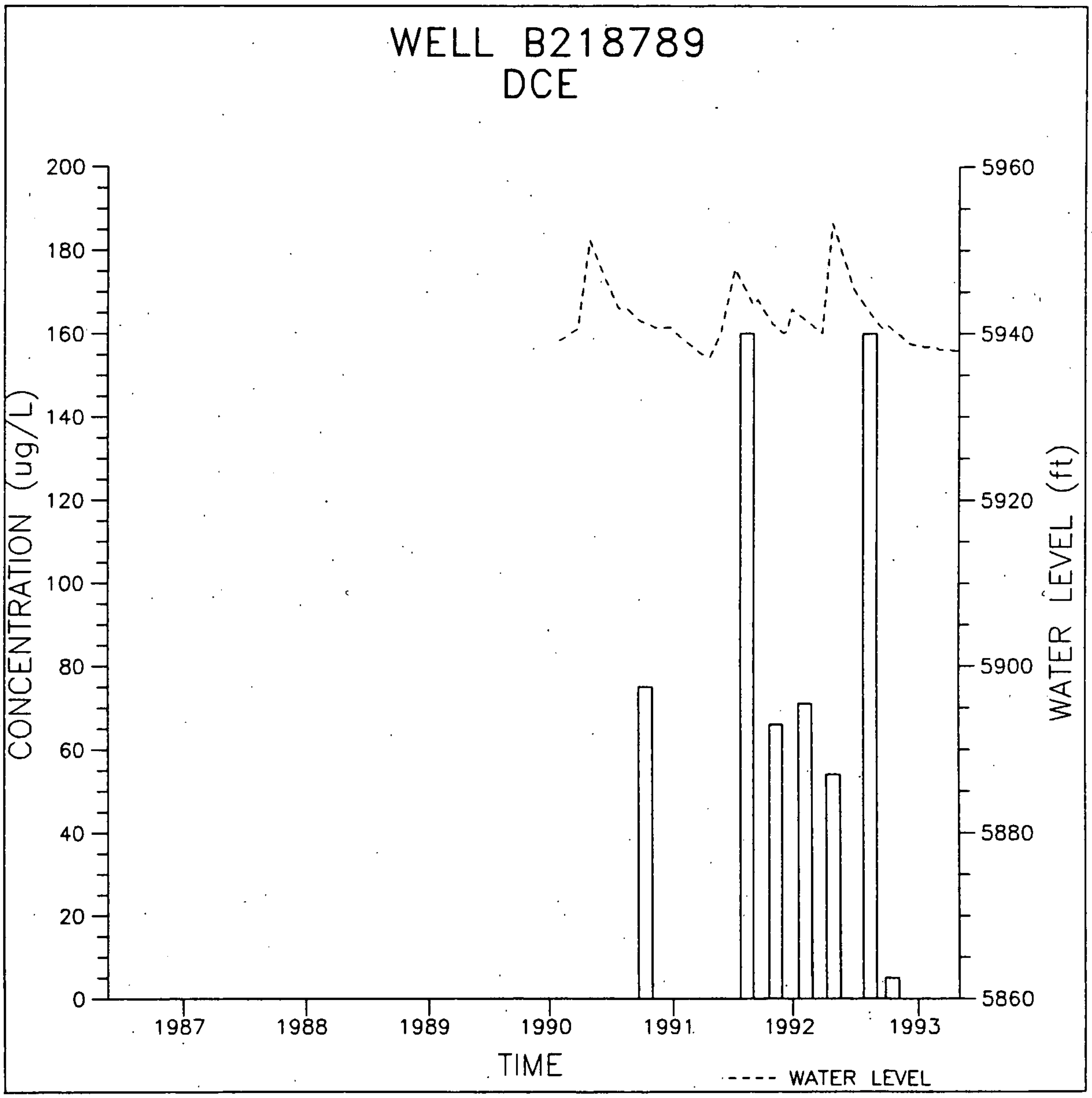
808


WELL B106089
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993

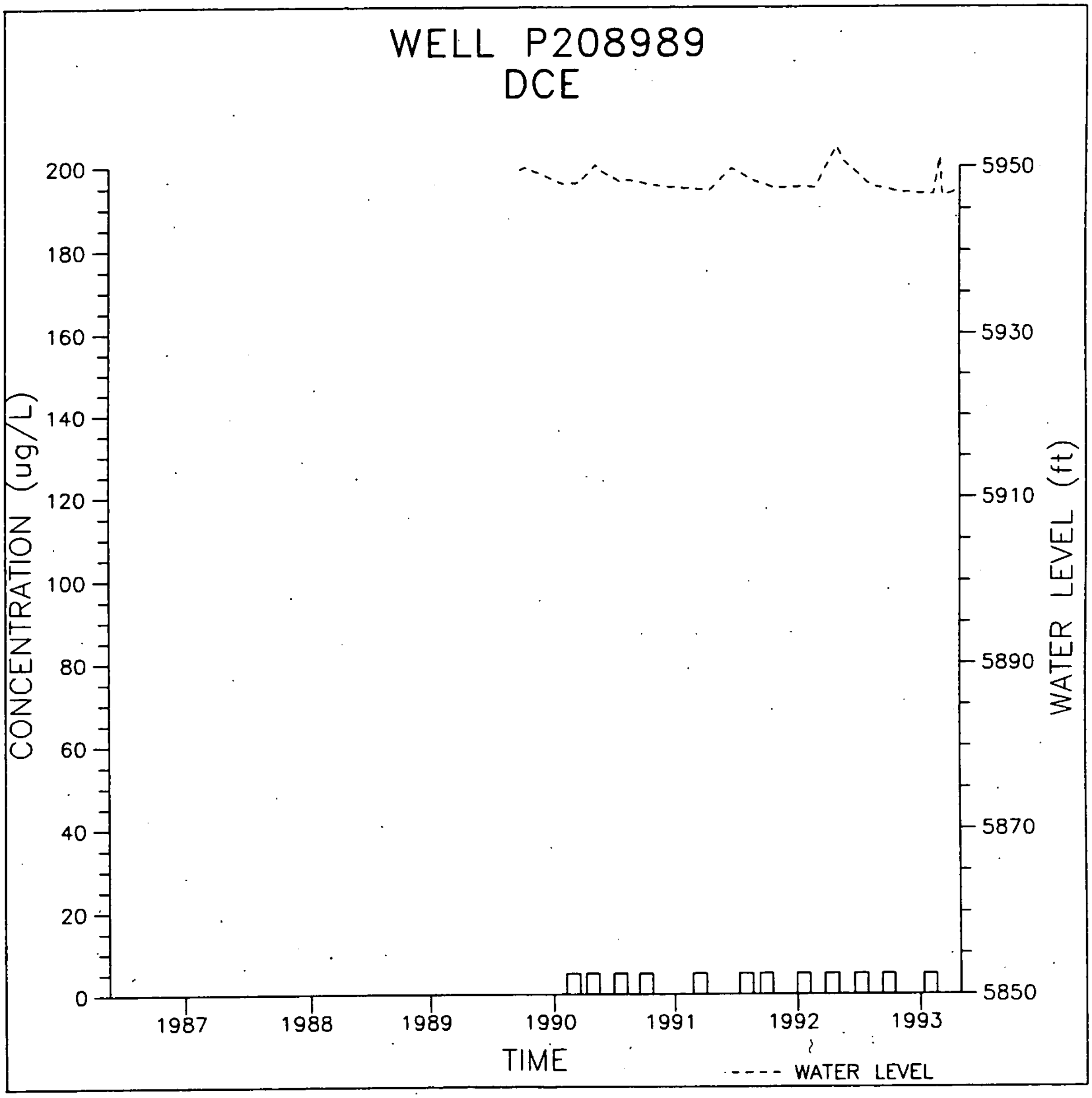
807


WELL B206389
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

808

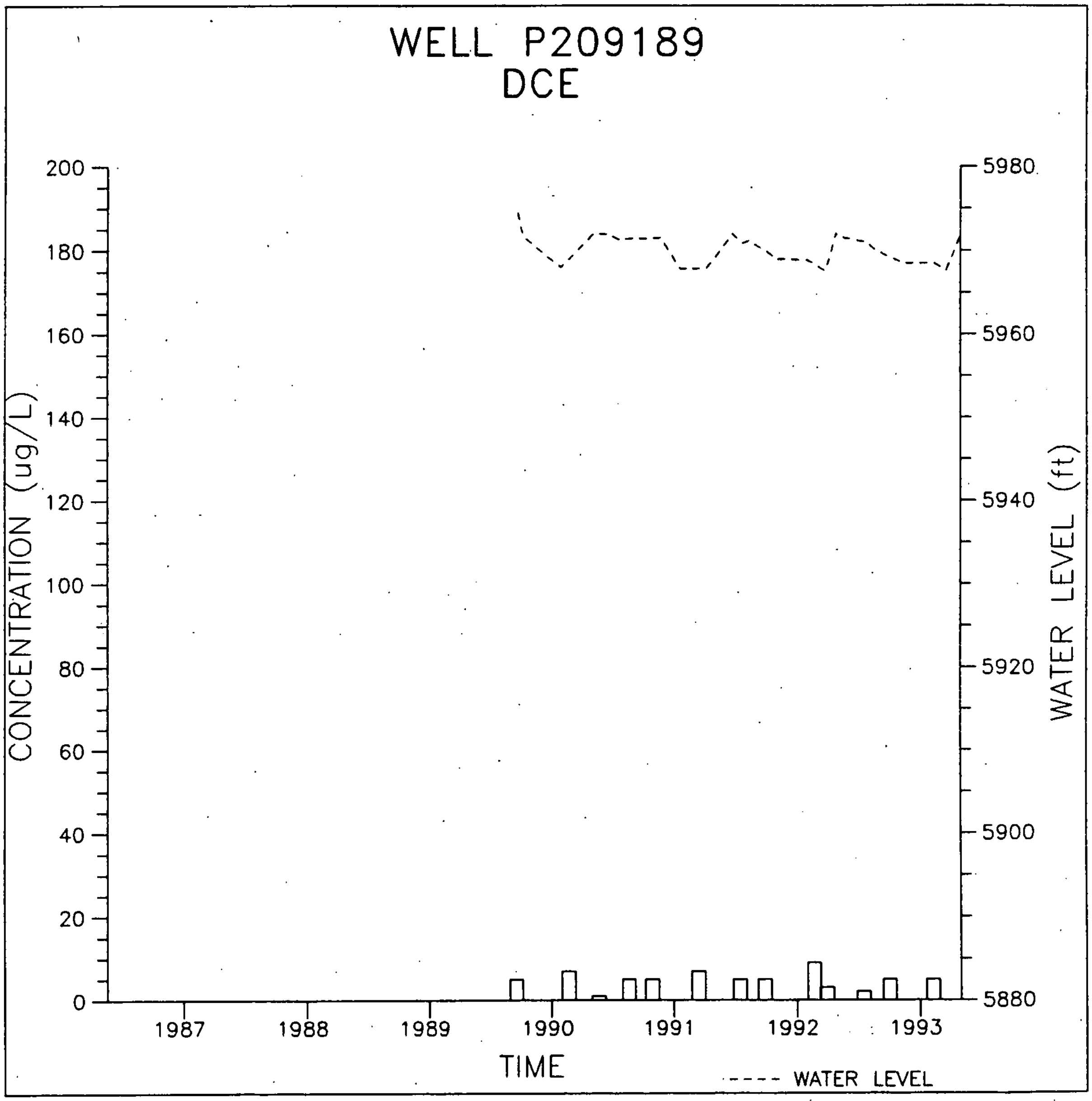

WELL B218789
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
0
20
40
60
80
100
120
140
160
180
200
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993

809


WELL P208989
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

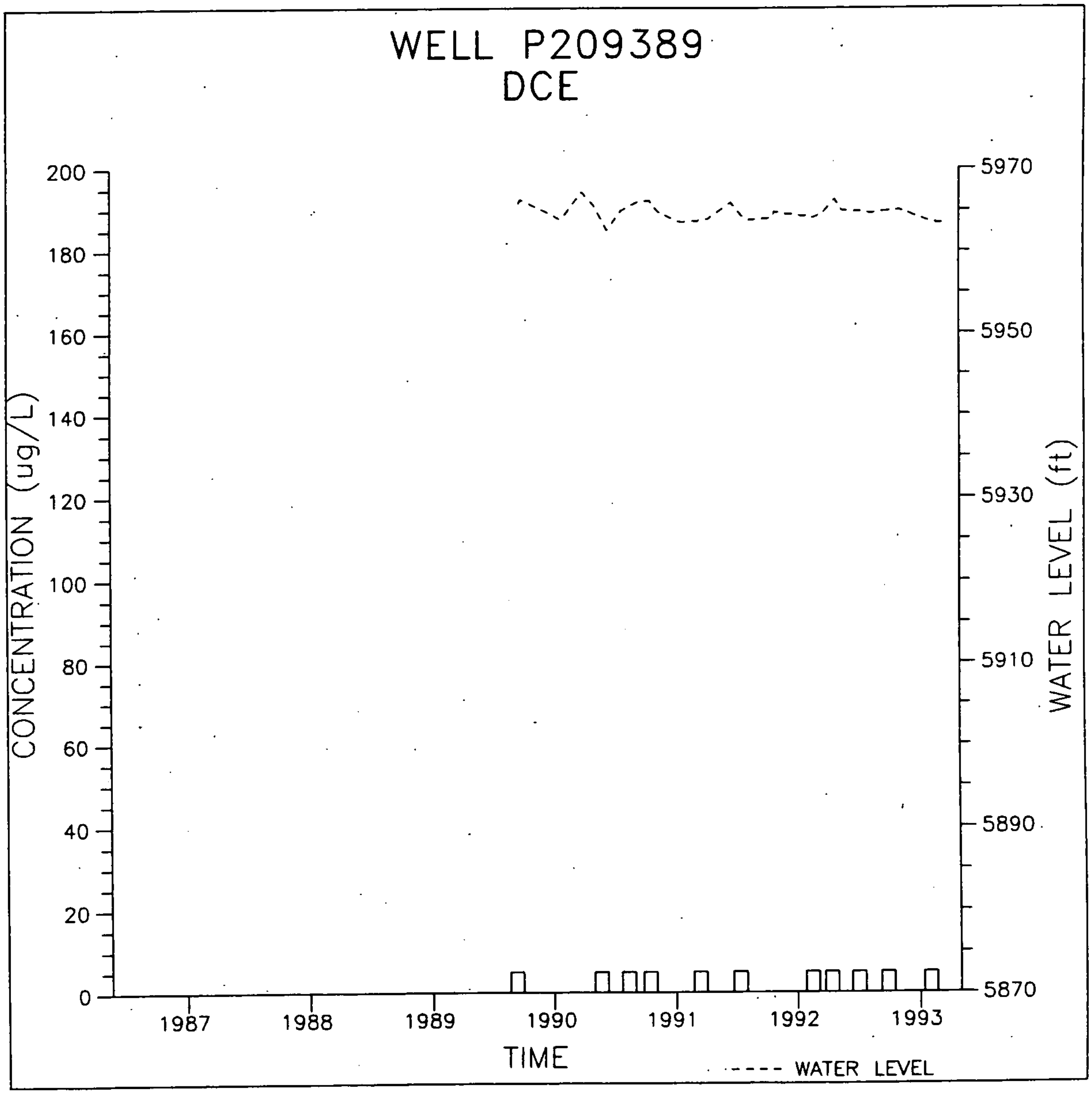
810

882

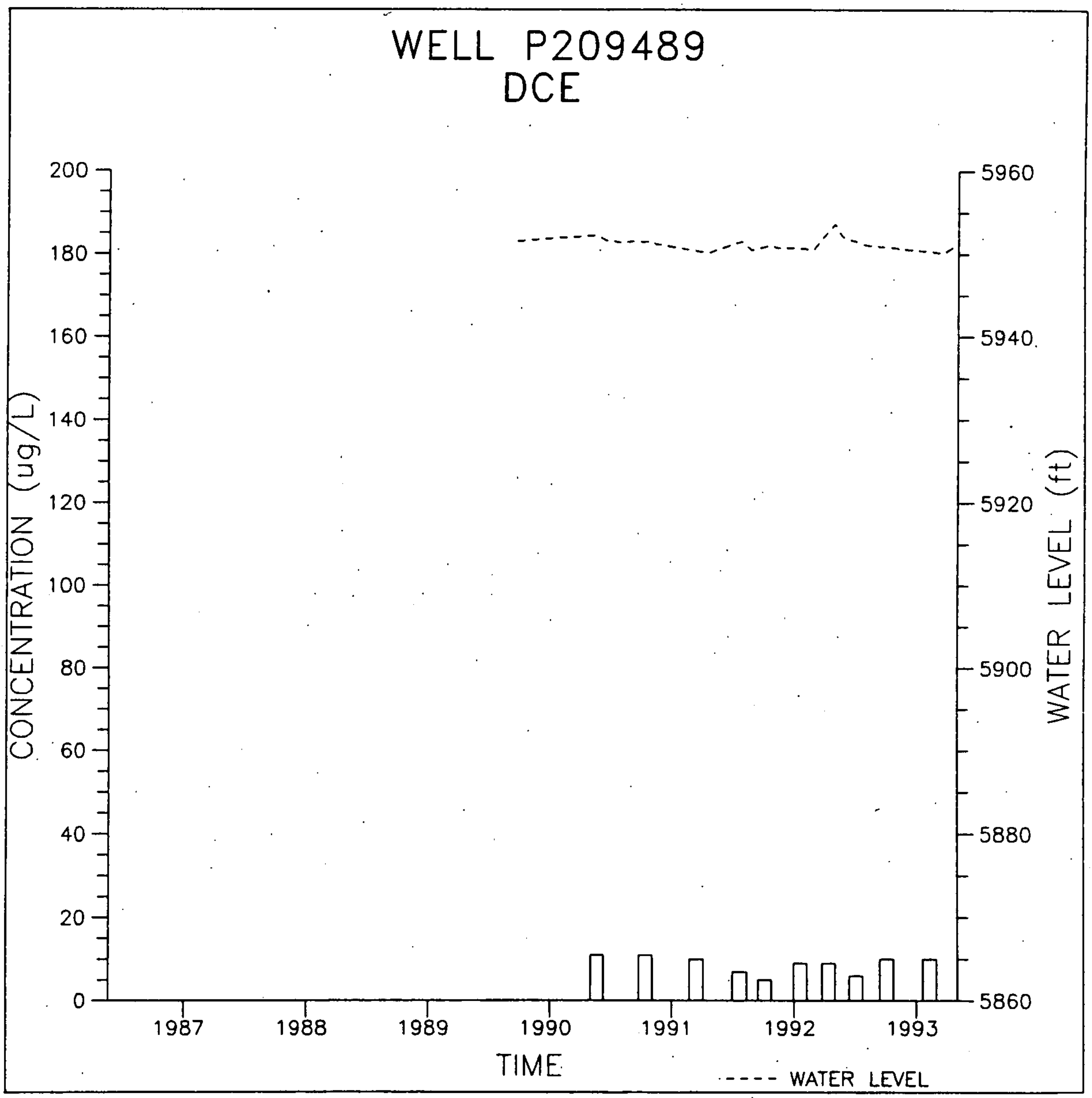


WELL P209189
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

811

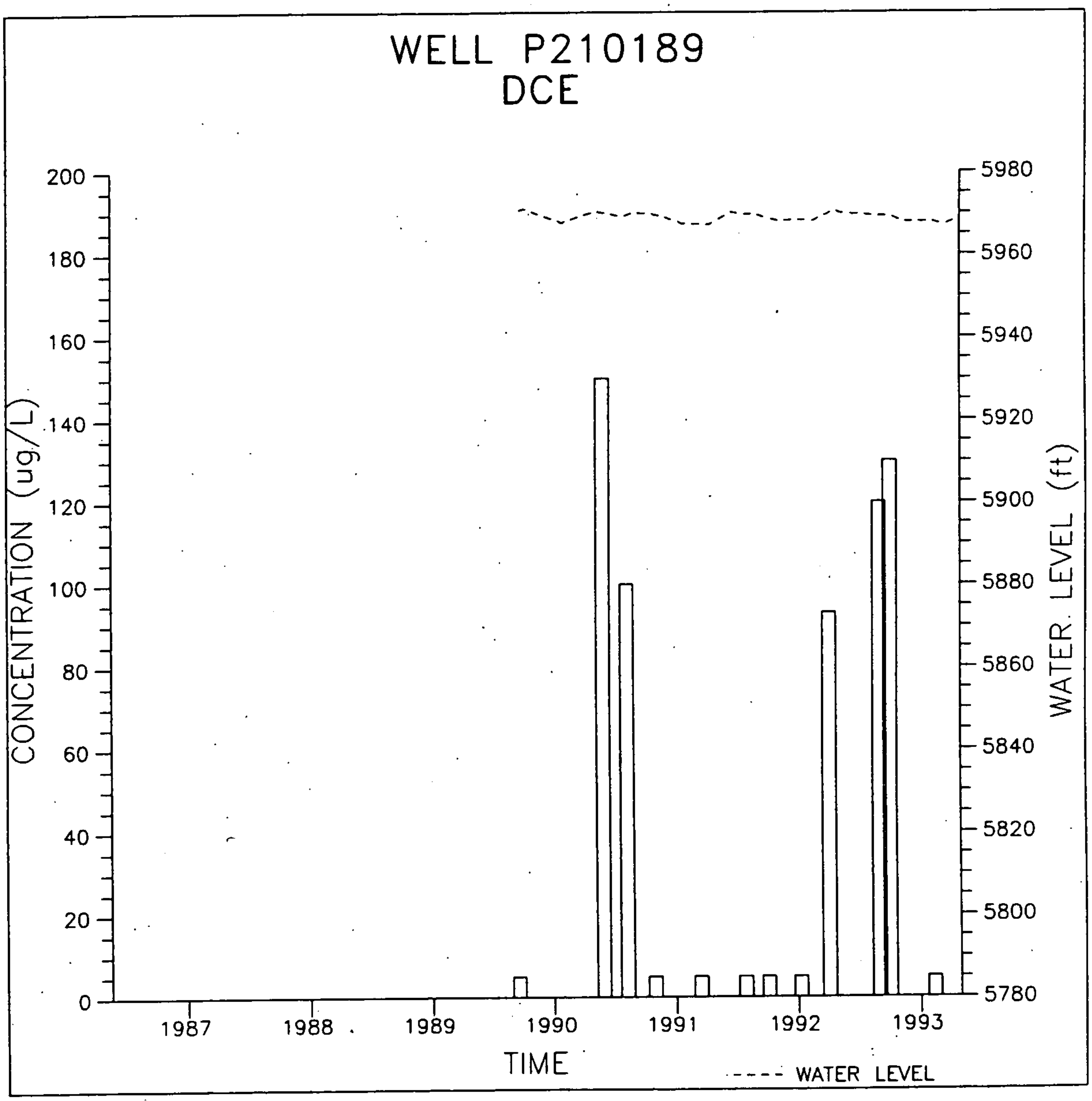

WELL P209389
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

812



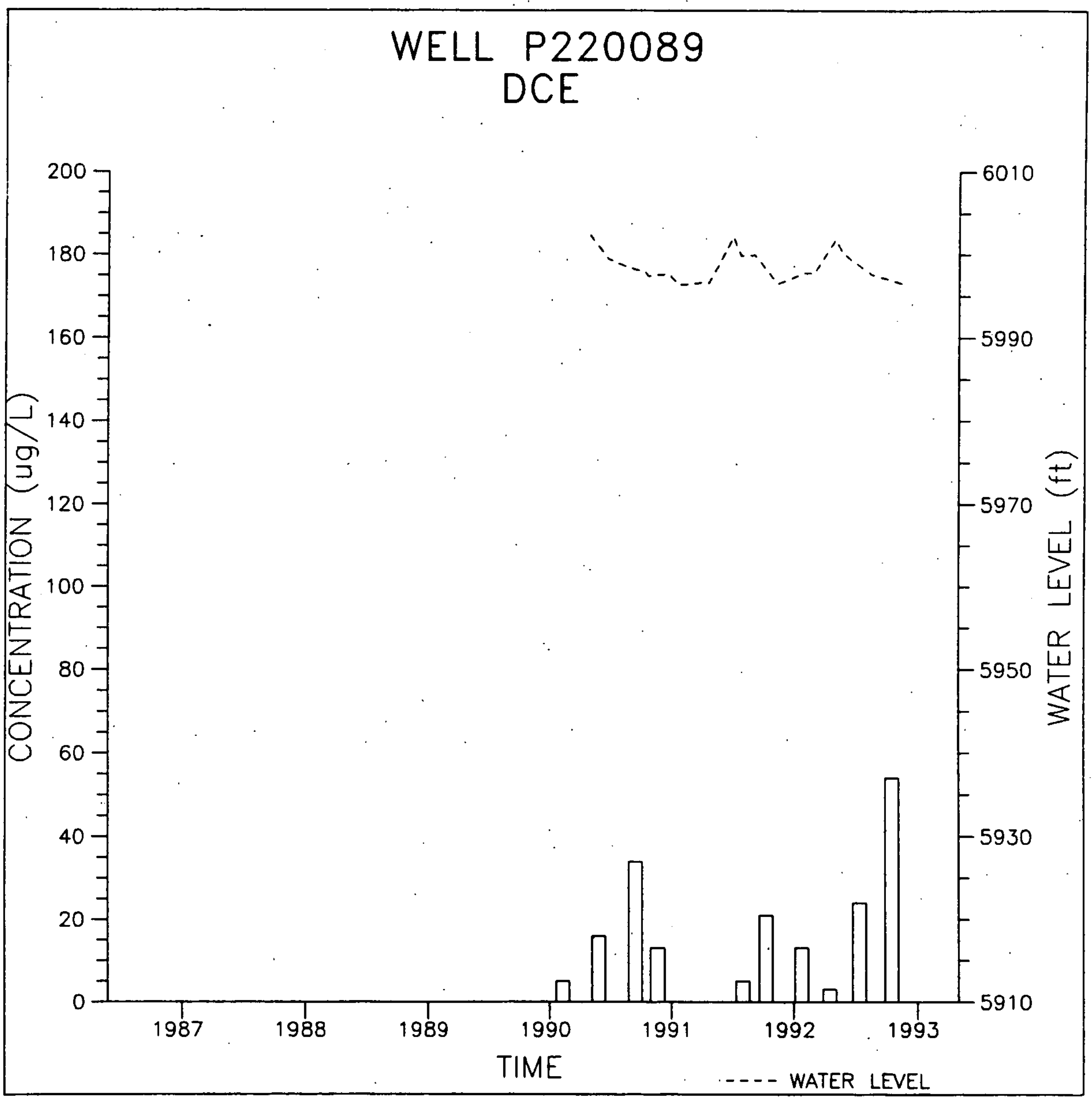
WELL P209489
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

813



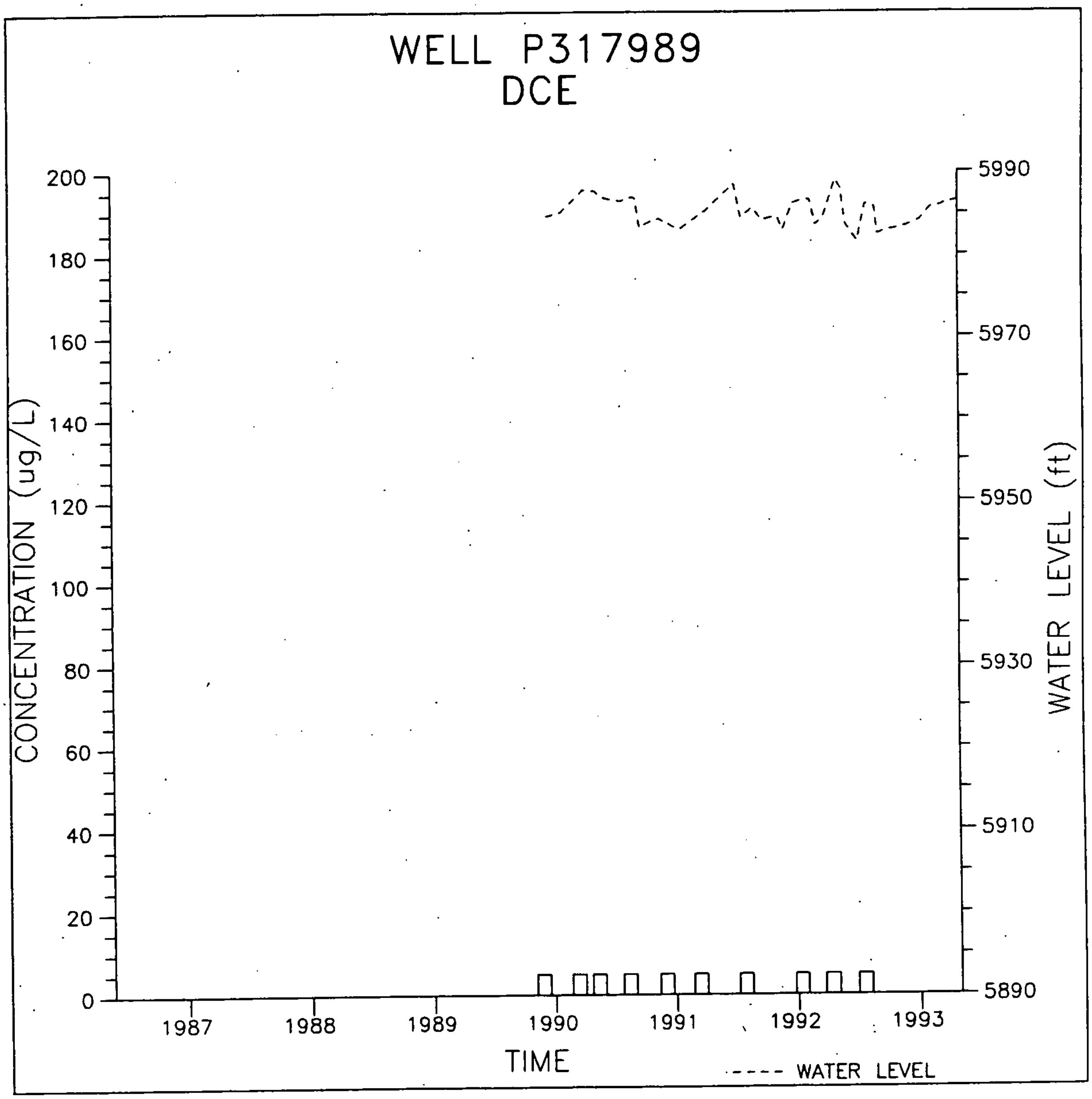
WELL P210189
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

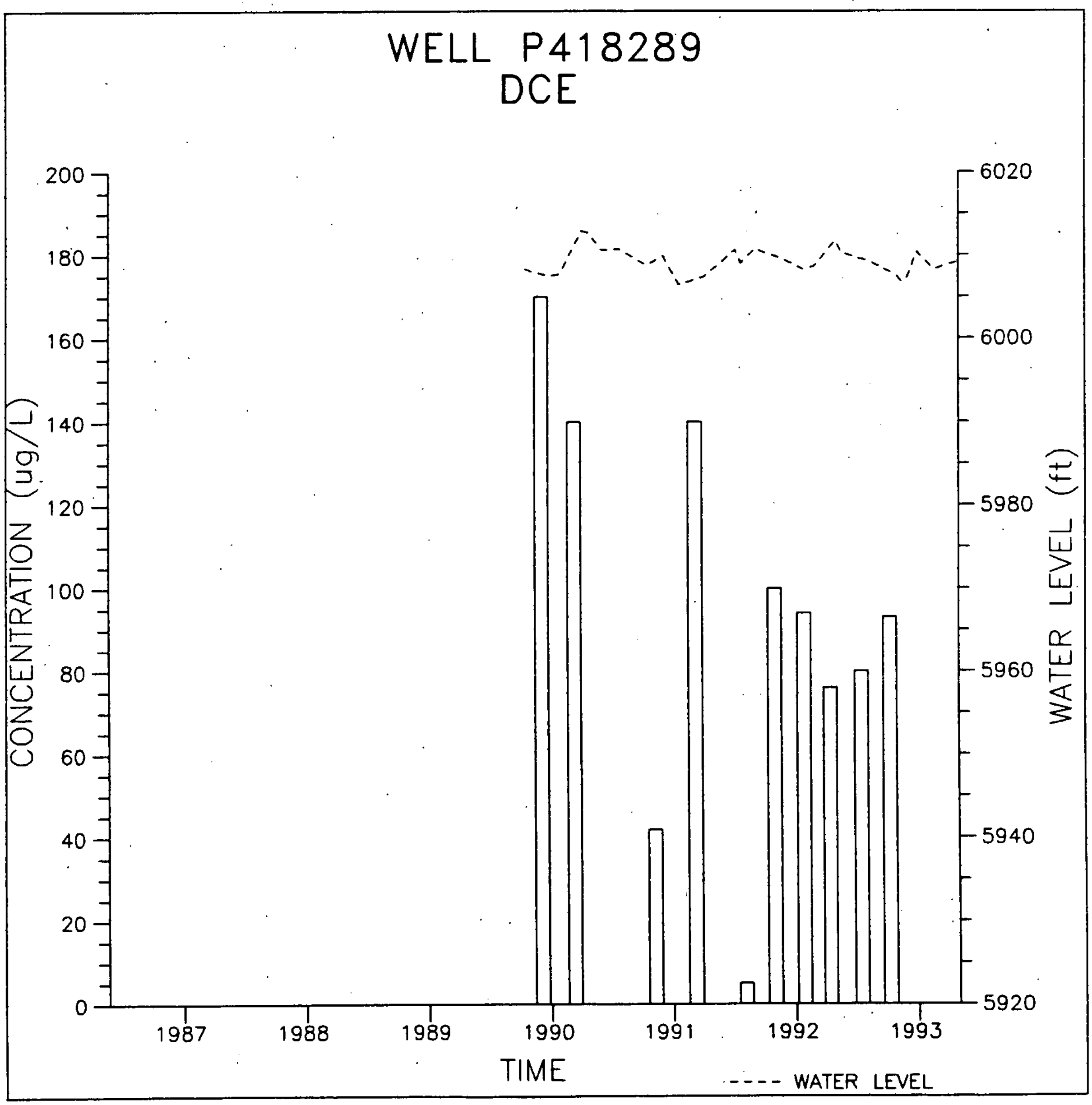
814


WELL P220089
DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL (ft)
6010
5990
5970
5950
5930
5910
WATER LEVEL

815

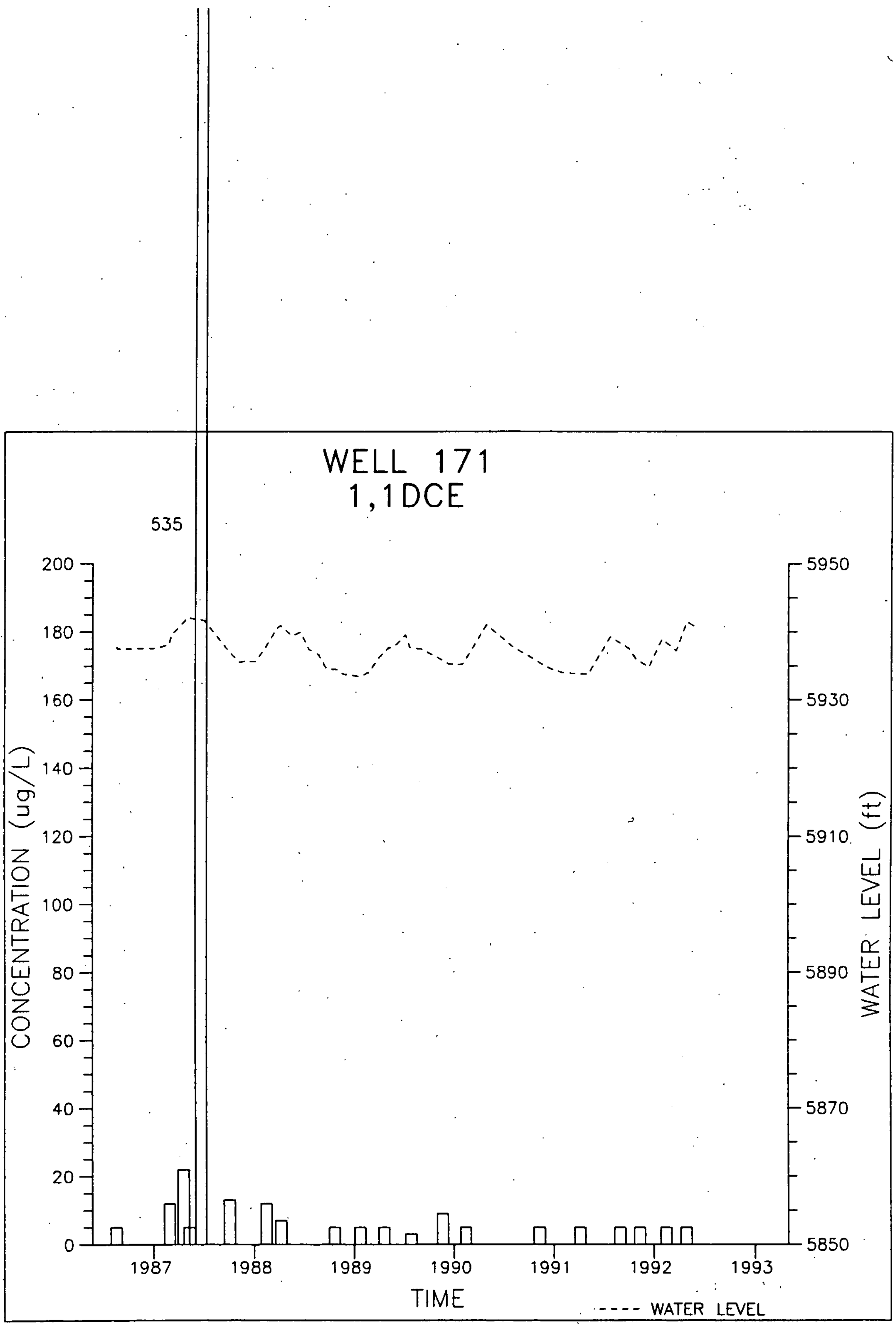
SDT


WELL P317989
DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5990
5970
5950
5930
5910
5890
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL



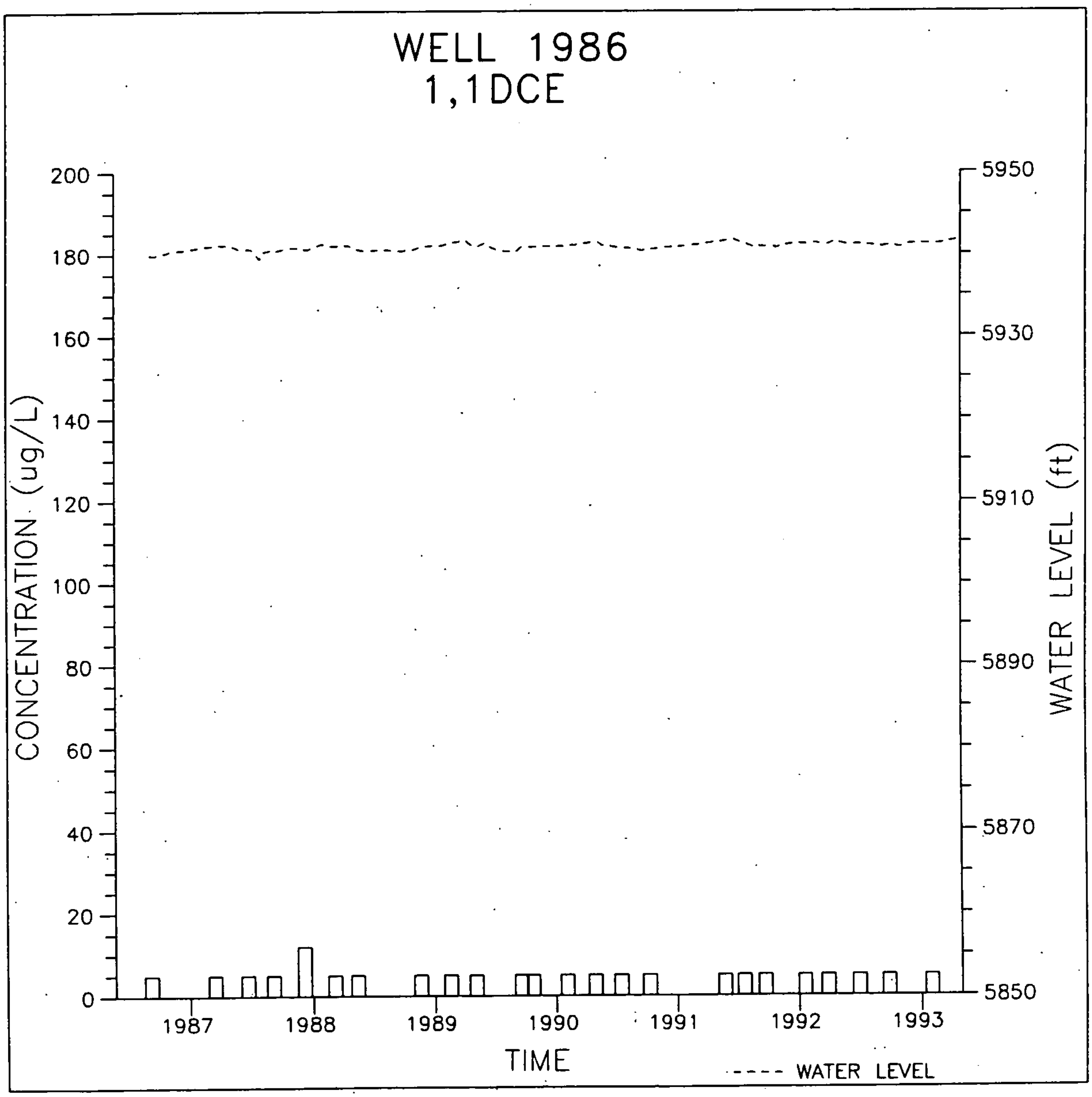
WELL P418289
DCE
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5920
5940
5960
5980
6000
6020
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

817



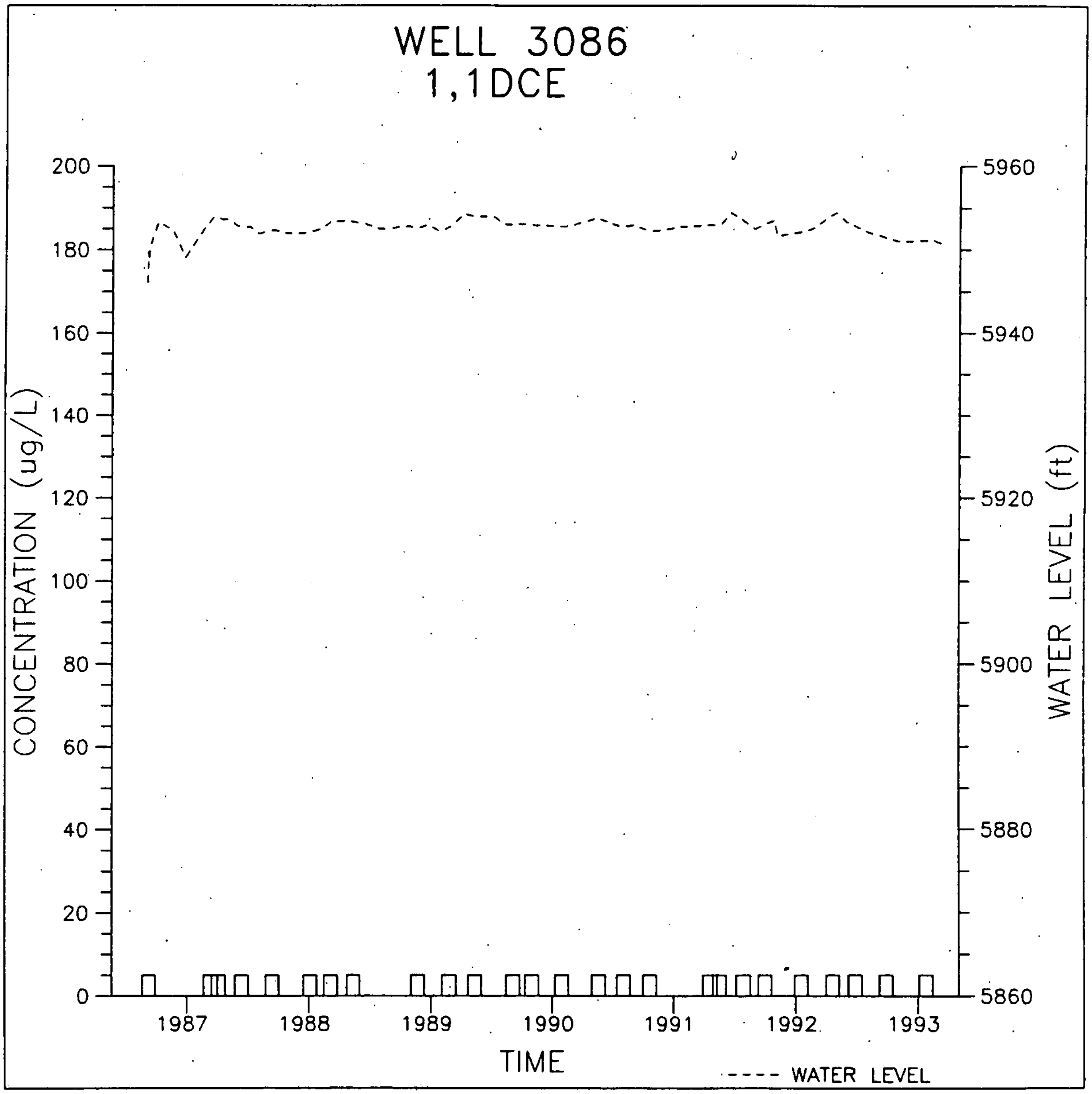
WELL 171
1,1DCE
535
CONCENTRATION (ug/L)
0
20
40
60
80
100
120
140
160
180
200
WATER LEVEL (ft)
5850
5870
5890
5910
5930
5950
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

818


WELL 1986
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5950
5930
5910
5890
5870
5850
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

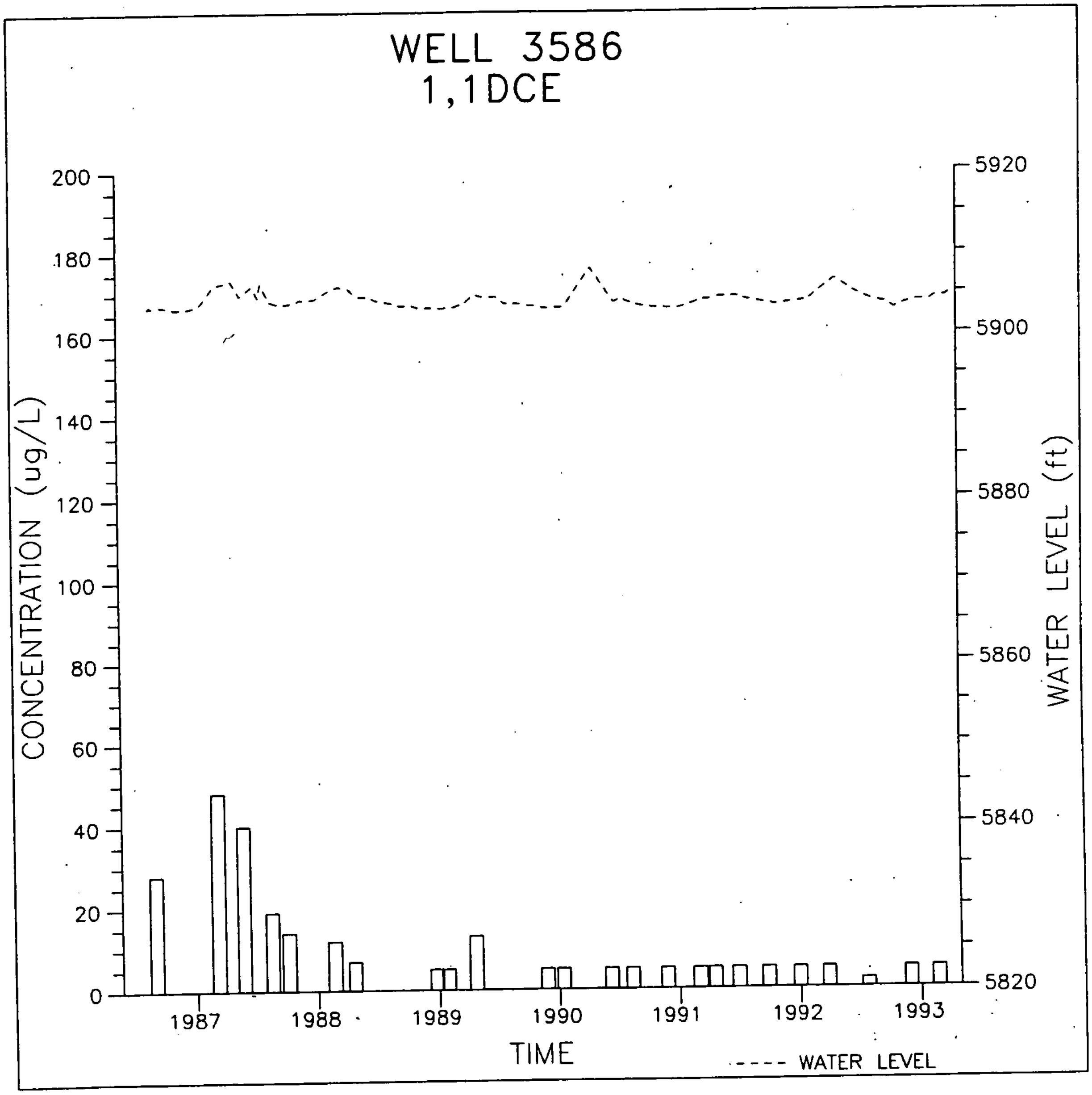
819

828

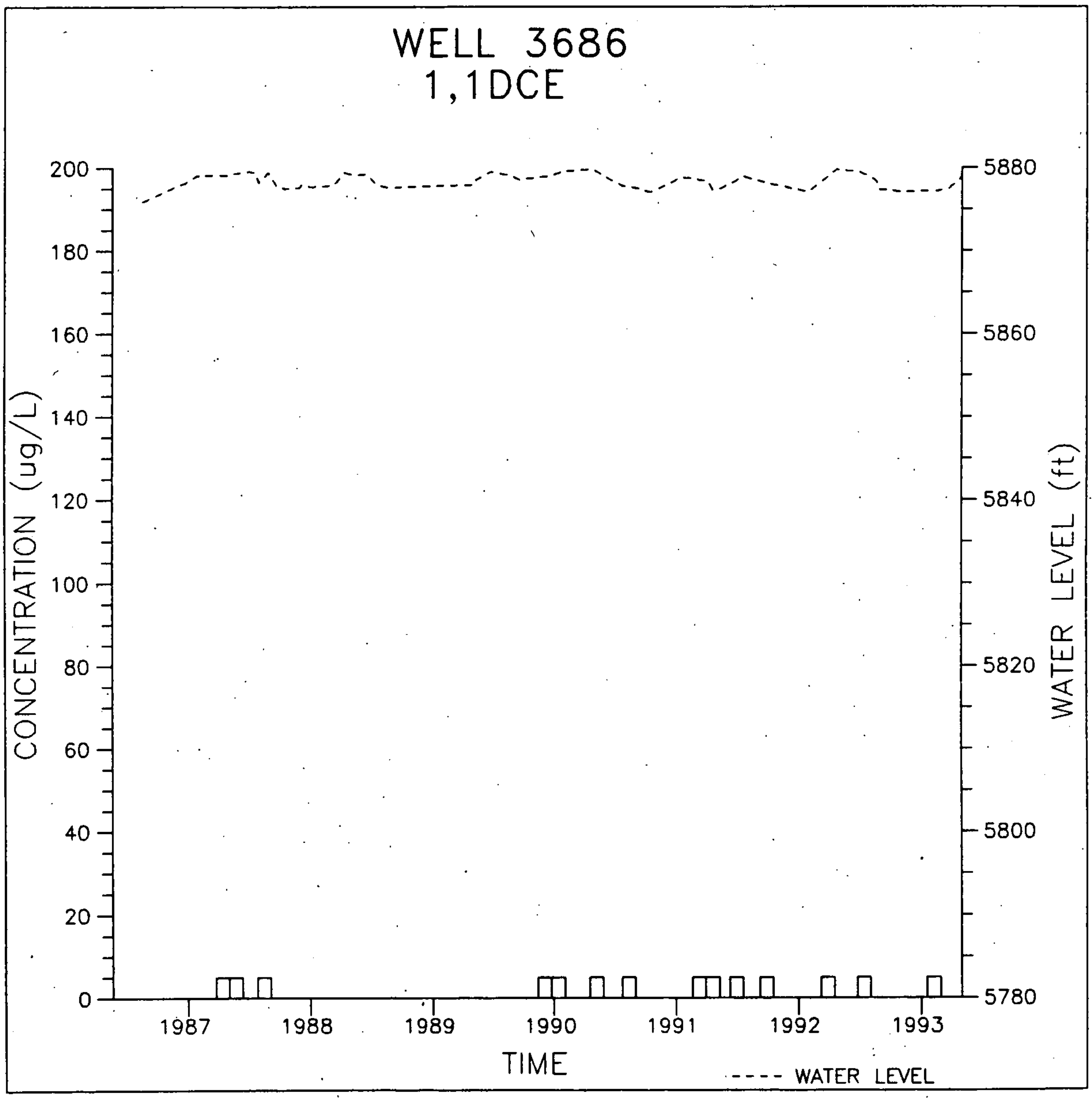


WELL 3086
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
0
20
40
60
80
100
120
140
160
180
200
5860
5880
5900
5920
5940
5960
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

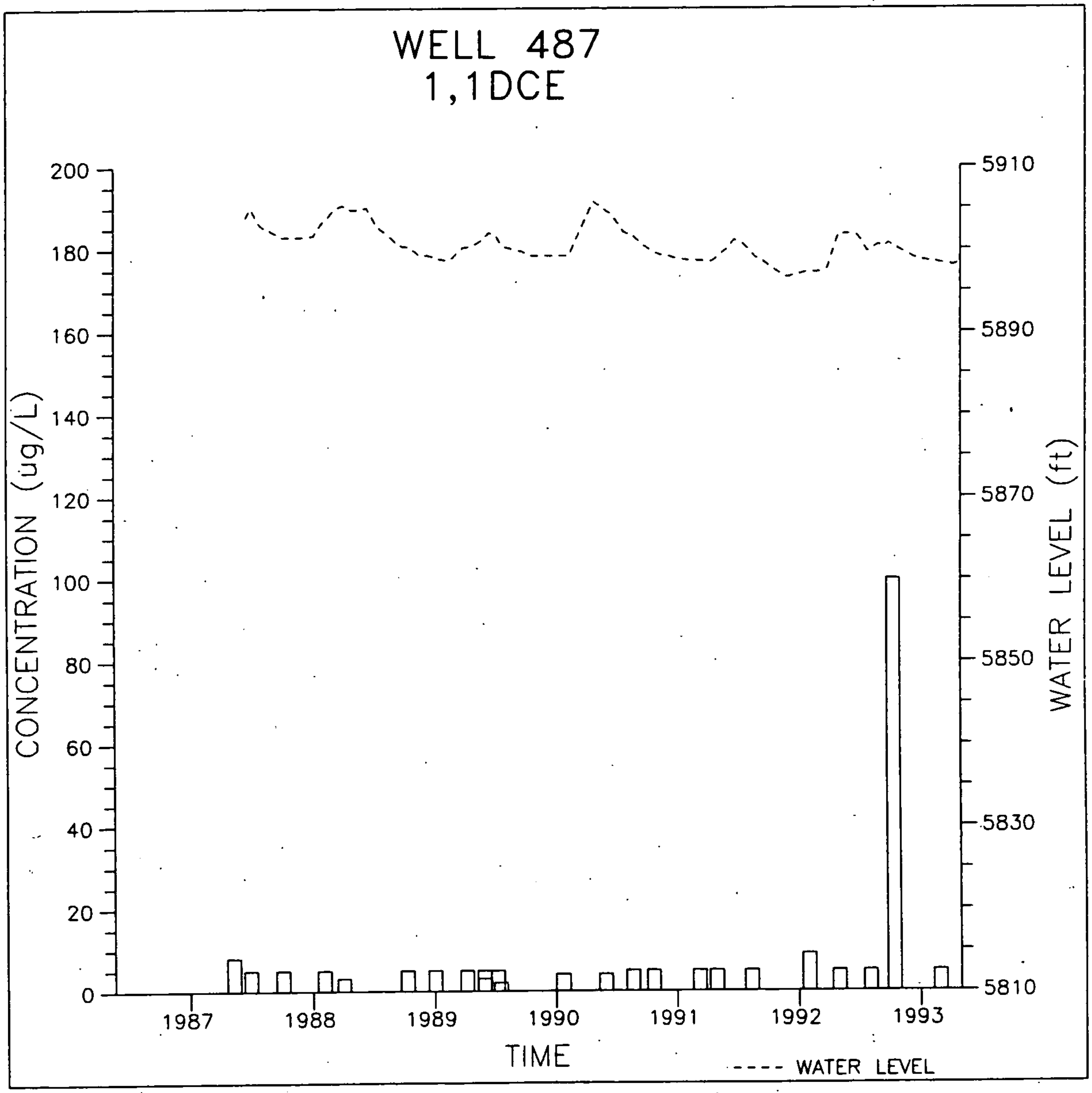
820


WELL 3586
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5920
5900
5880
5860
5840
5820
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

821

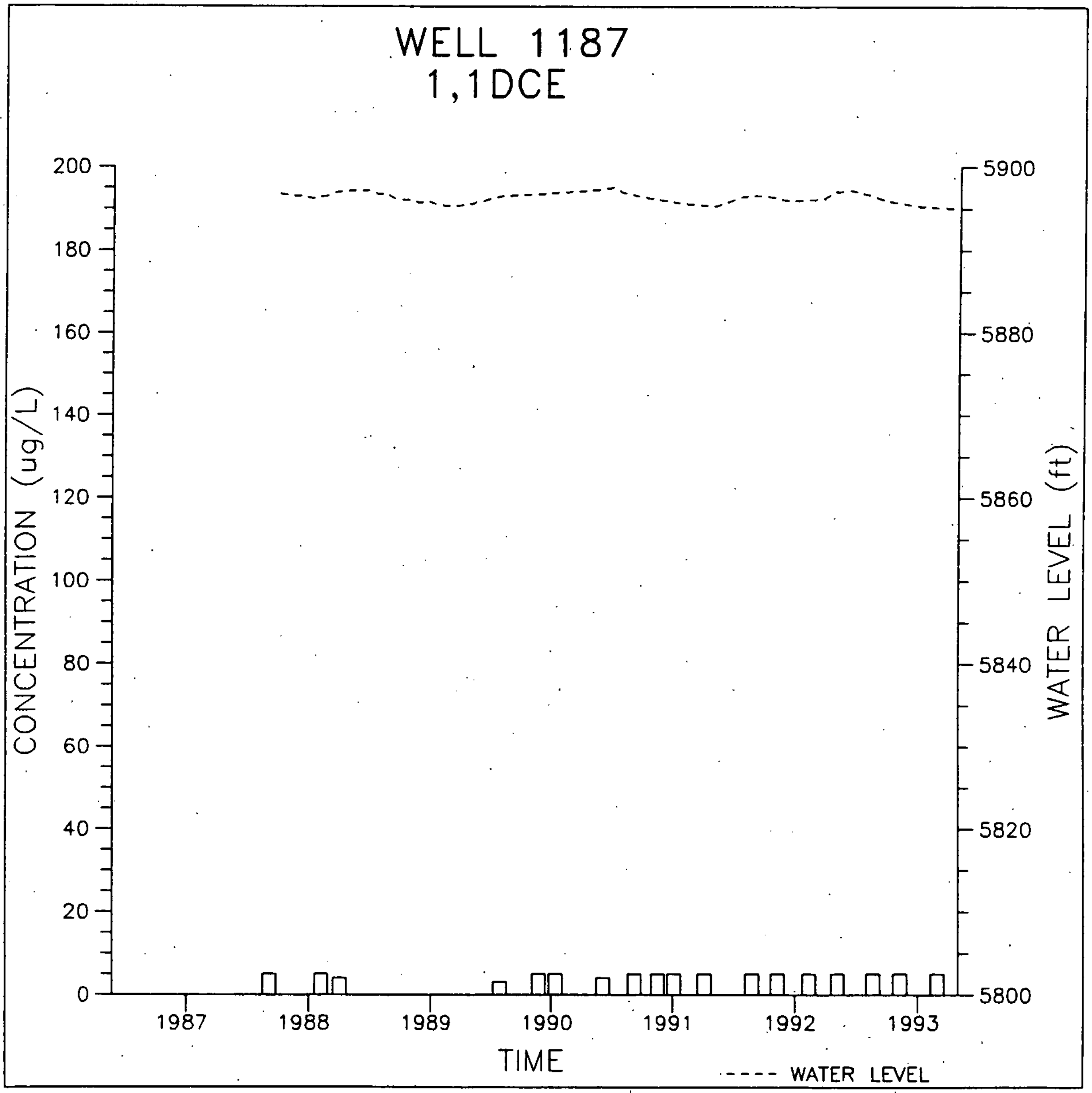

WELL 3686
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5880
5860
5840
5820
5800
5780
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

822


WELL 487
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
TIME
---- WATER LEVEL
200
180
160
140
120
100
80
60
40
20
0
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993

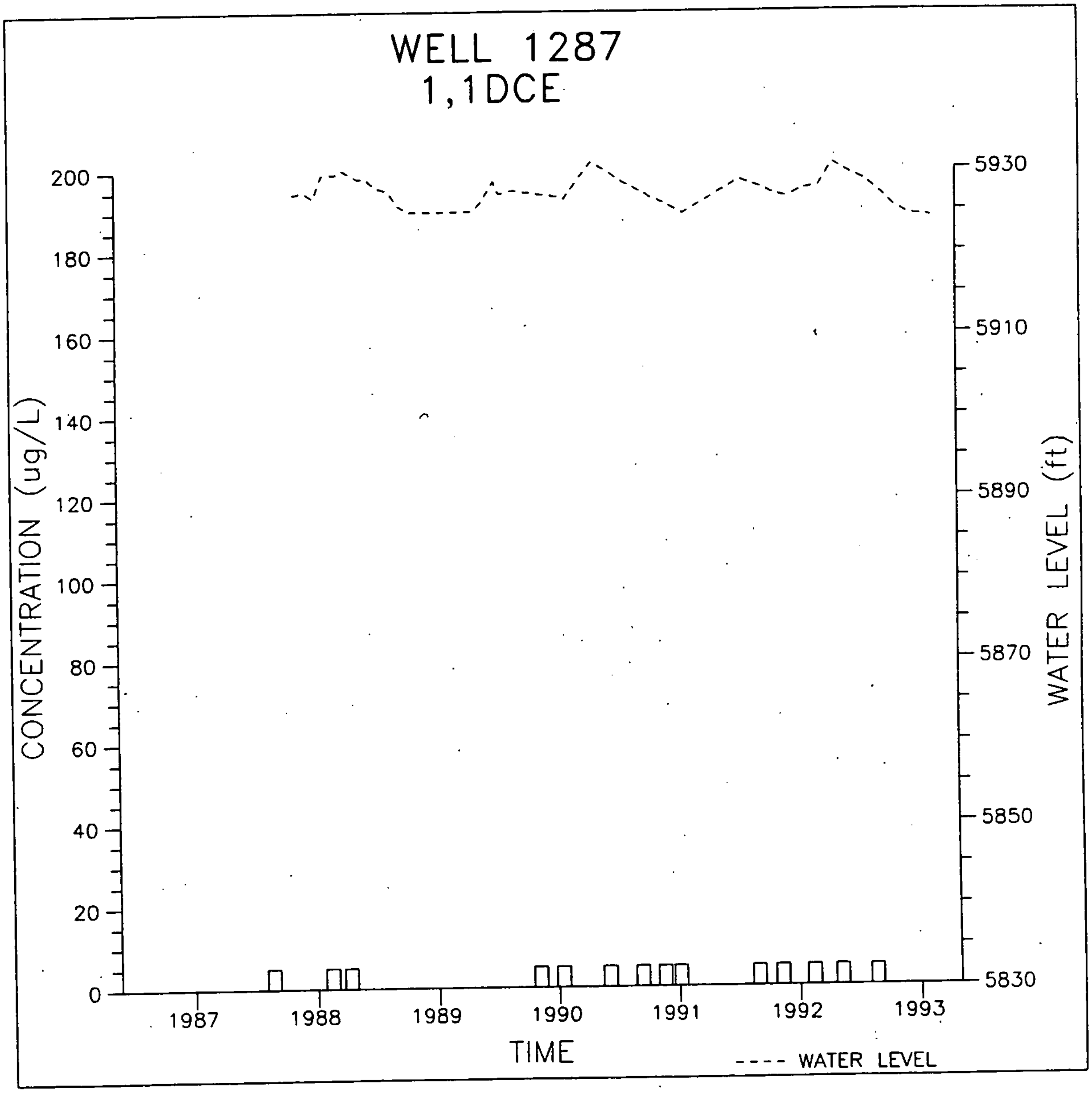
823

885



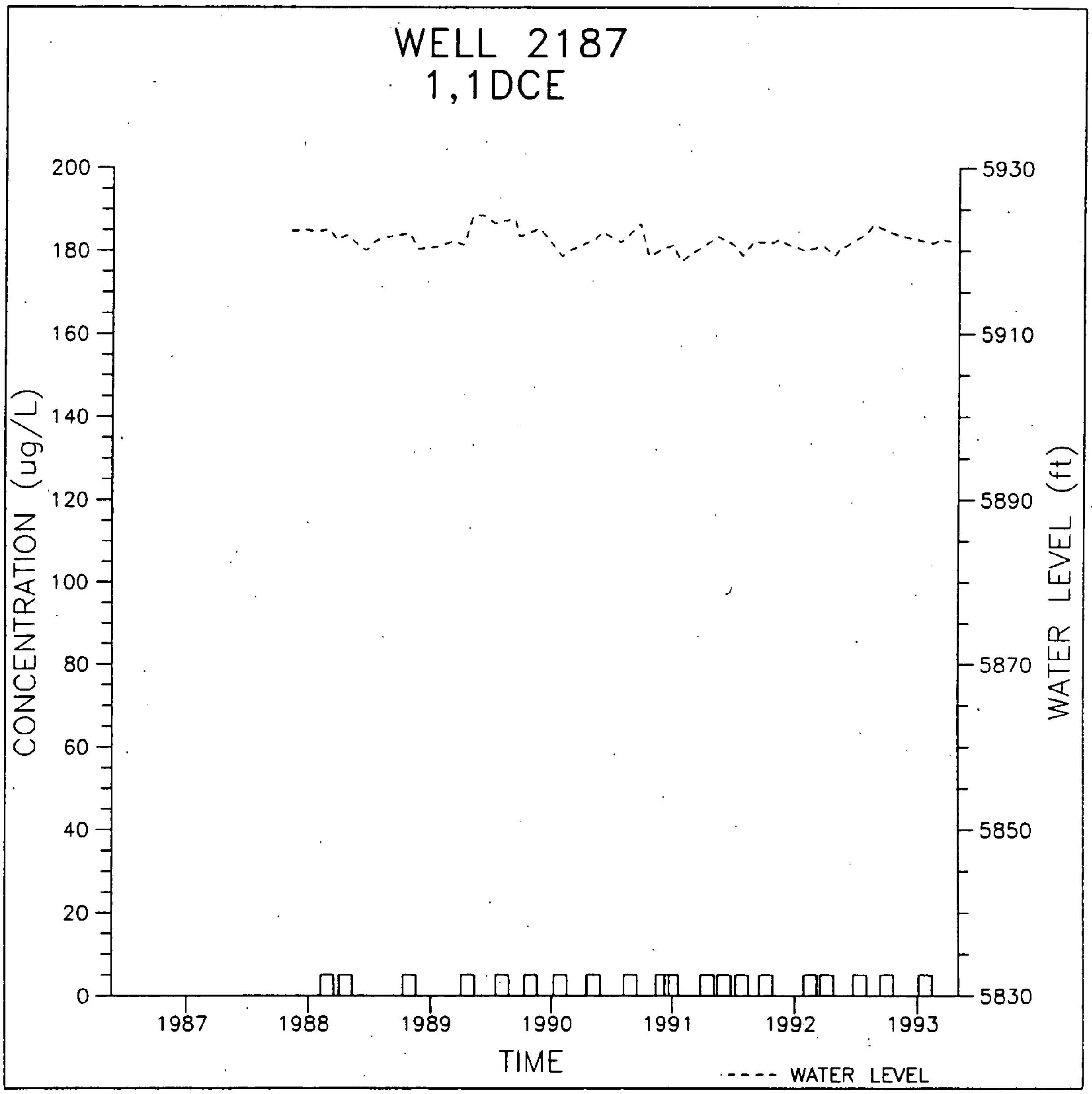
WELL 1187
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5900
5880
5860
5840
5820
5800
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

824


WELL 1287
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

825

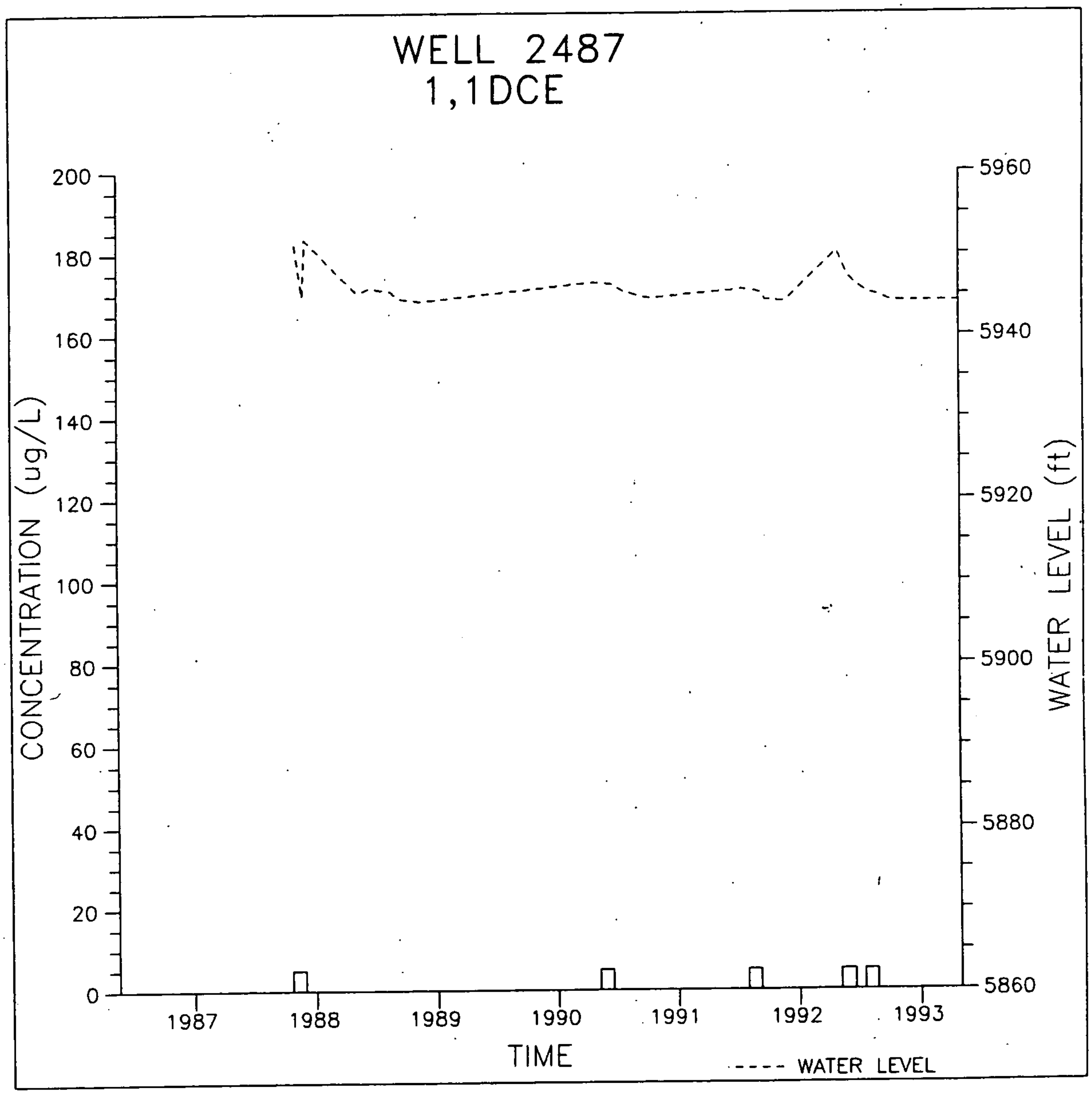
887



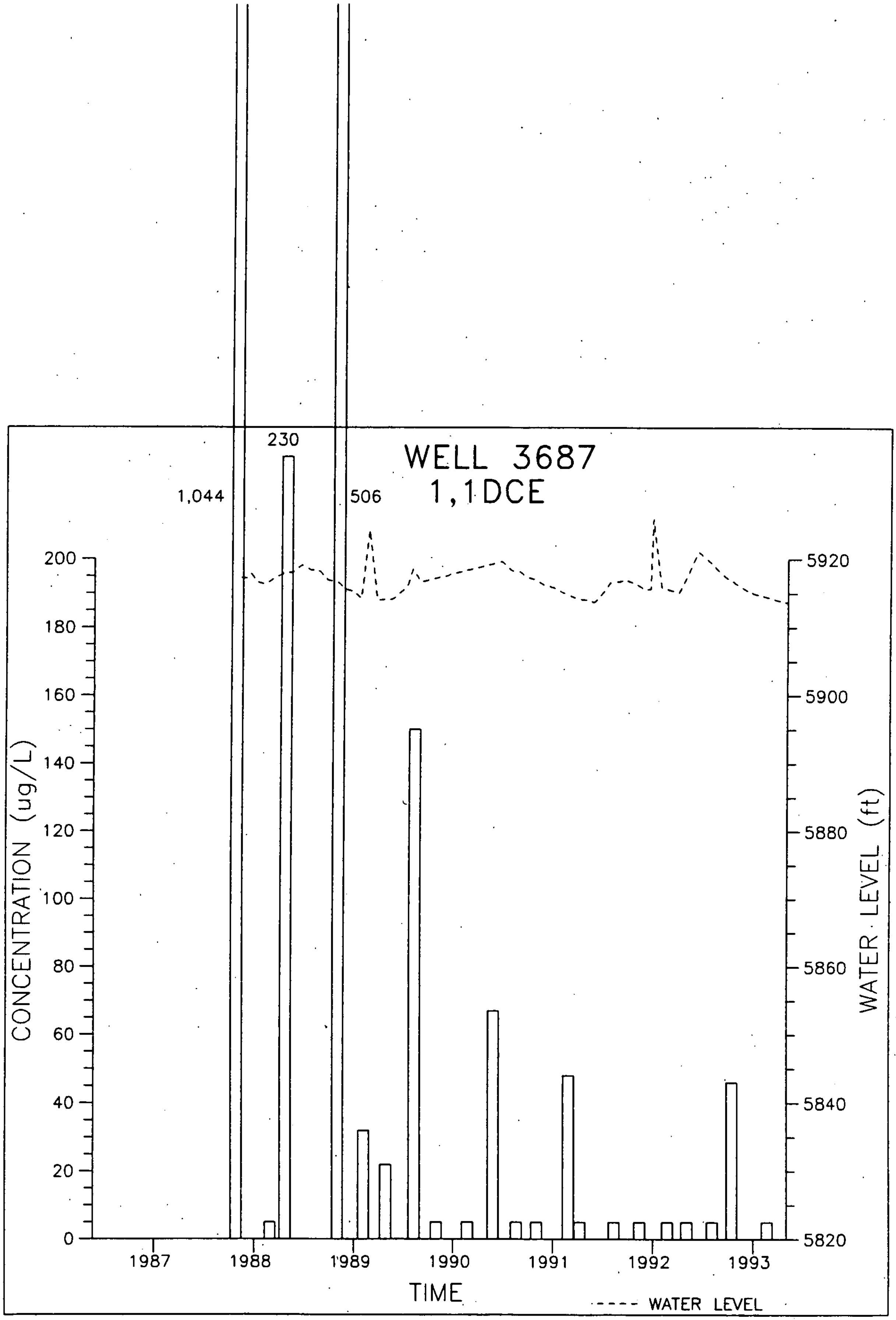
WELL 2187
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

826

838

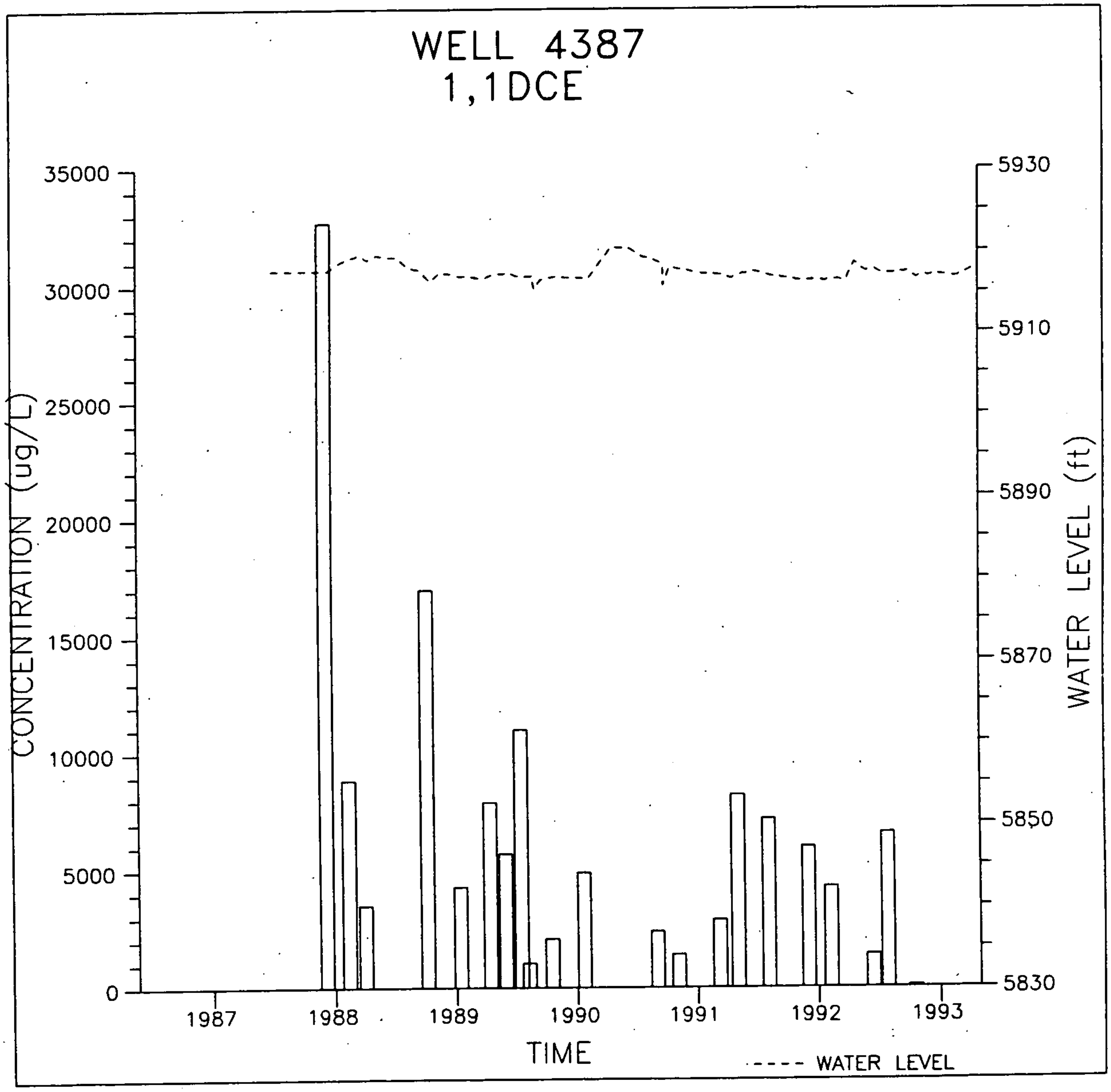

WELL 2487
1,1DCE
CONCENTRATION (ug/L)
WATER LEVEL (ft)
200
180
160
140
120
100
80
60
40
20
0
5960
5940
5920
5900
5880
5860
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

827


WELL 3687
1,1DCE
230
1,044
506
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
1987
1988
1989
1990
1991
1992
1993
TIME
5920
5900
5880
5860
5840
5820
WATER LEVEL (ft)
WATER LEVEL

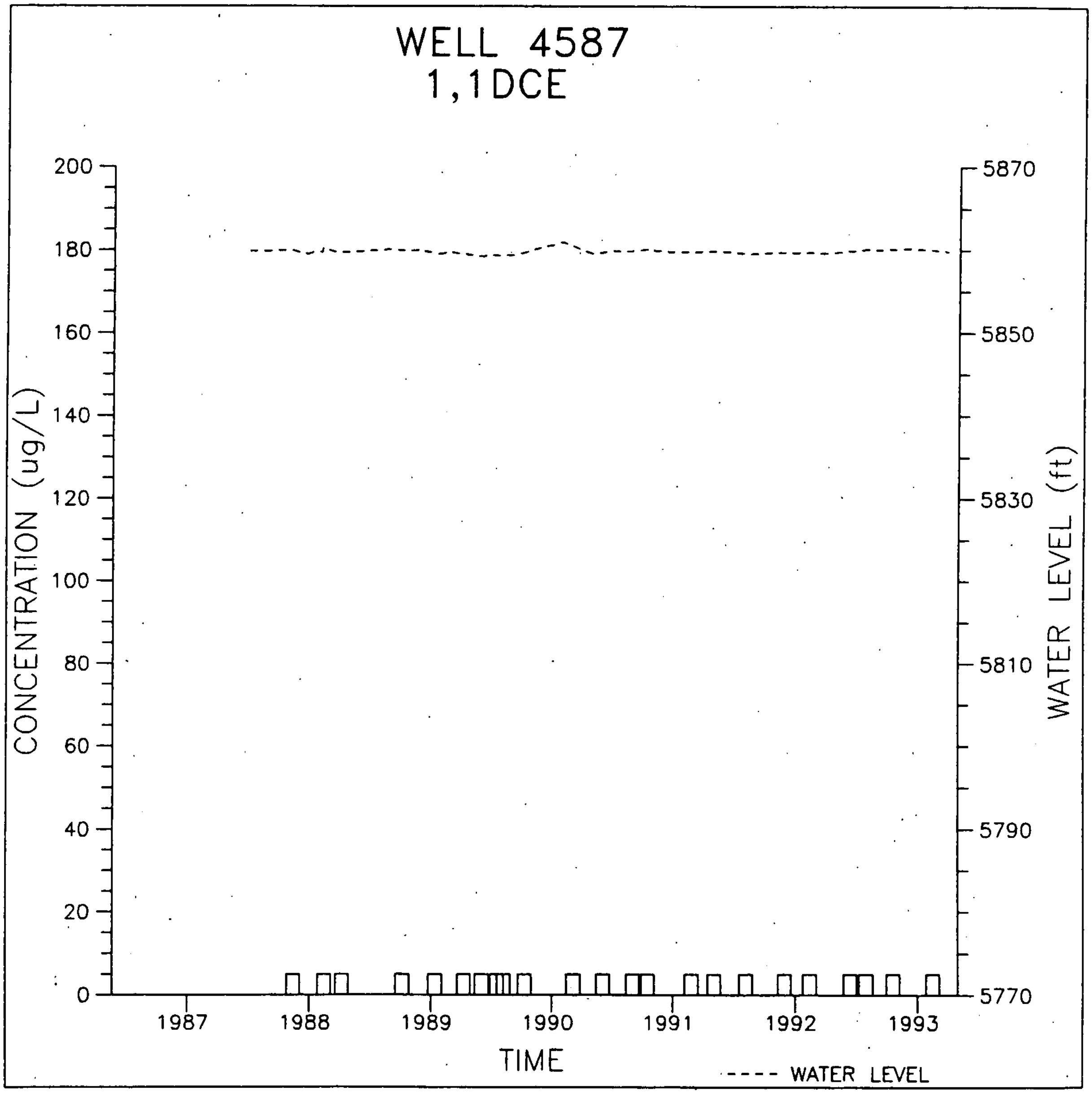
828

830



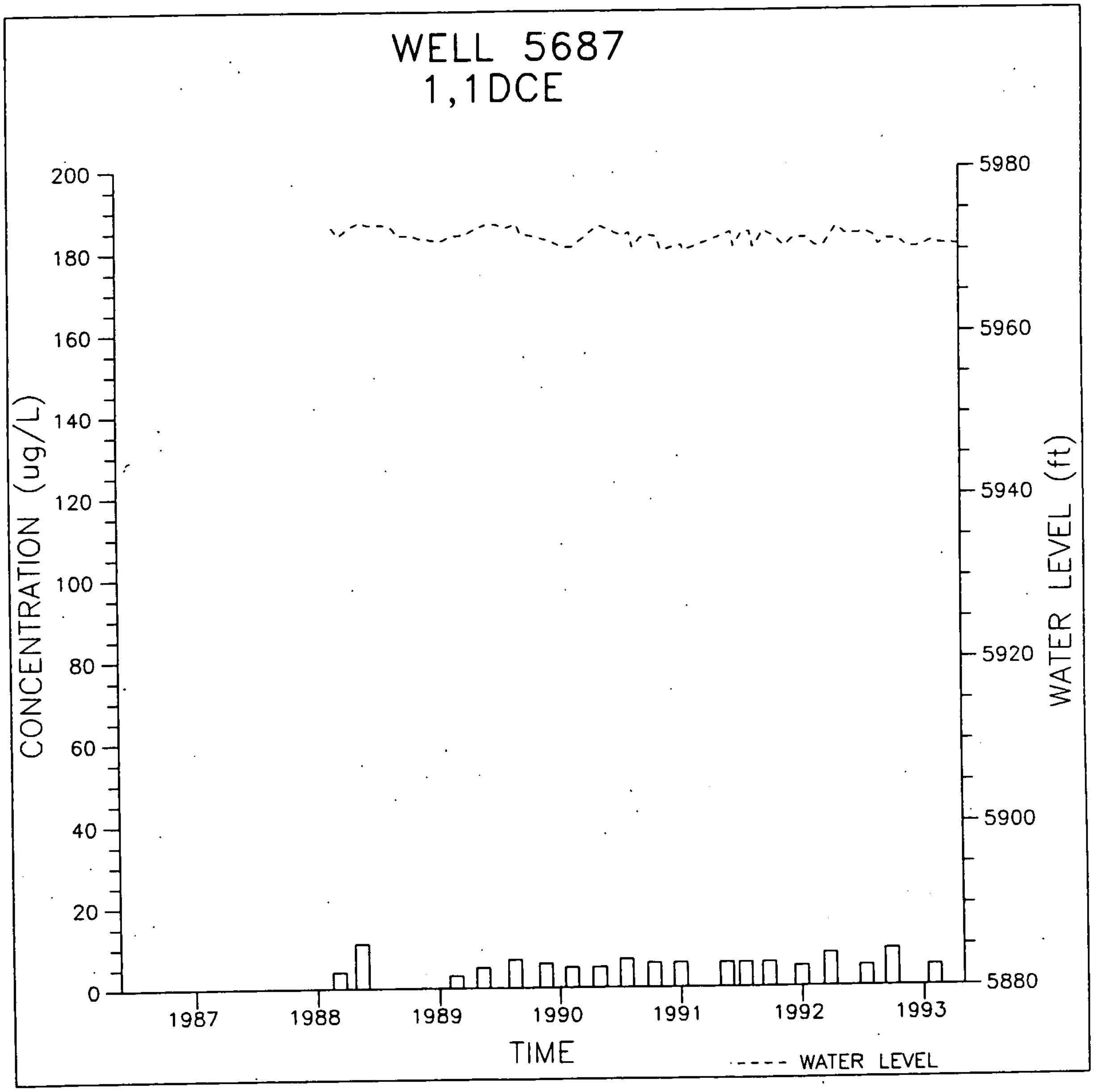
WELL 4387
1,1DCE
CONCENTRATION (ug/L)
35000
30000
25000
20000
15000
10000
5000
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

829


WELL 4587
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5870
5850
5830
5810
5790
5770
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

830

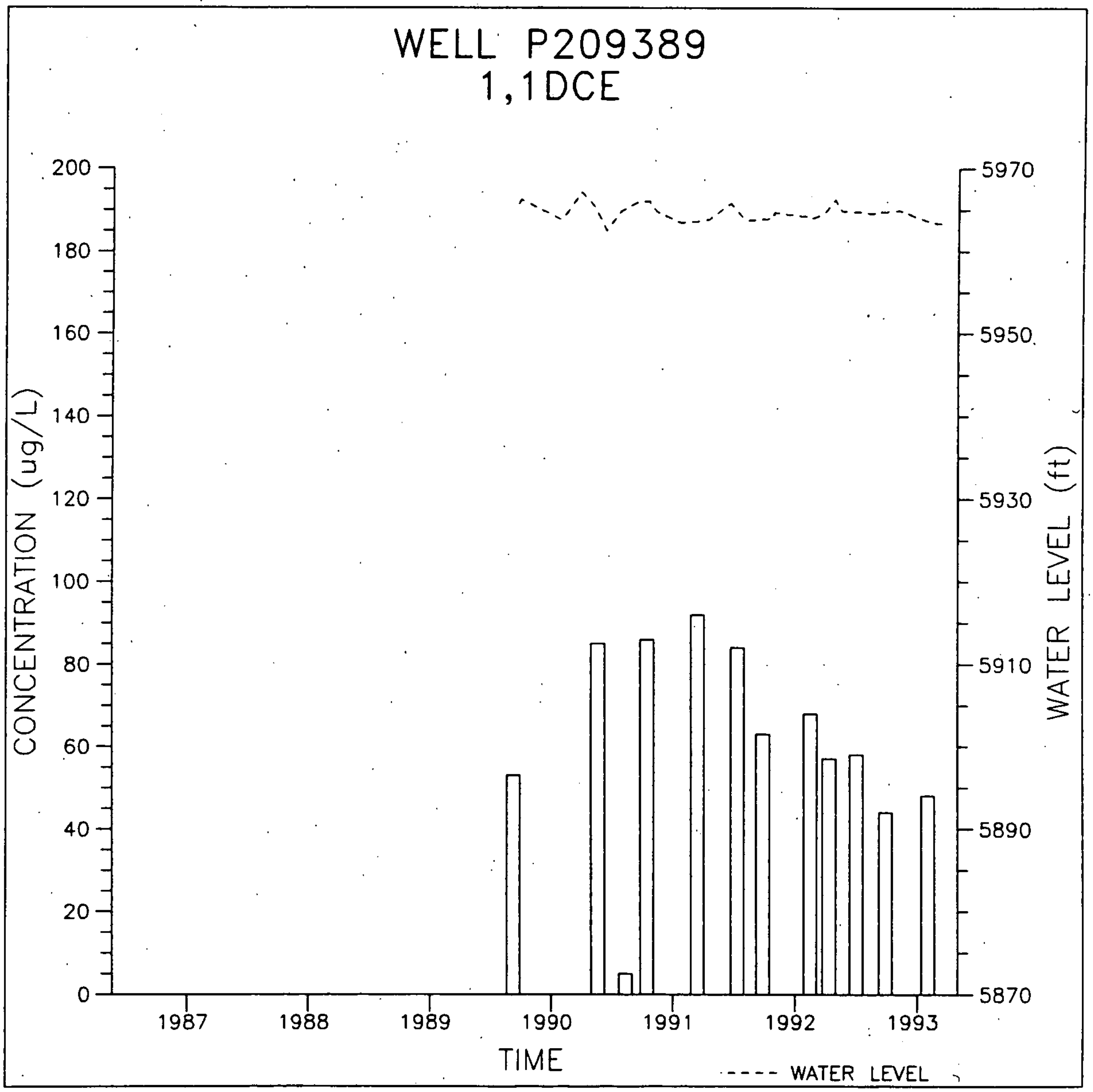
858



WELL 5687
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5980
5960
5940
5920
5900
5880
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

831

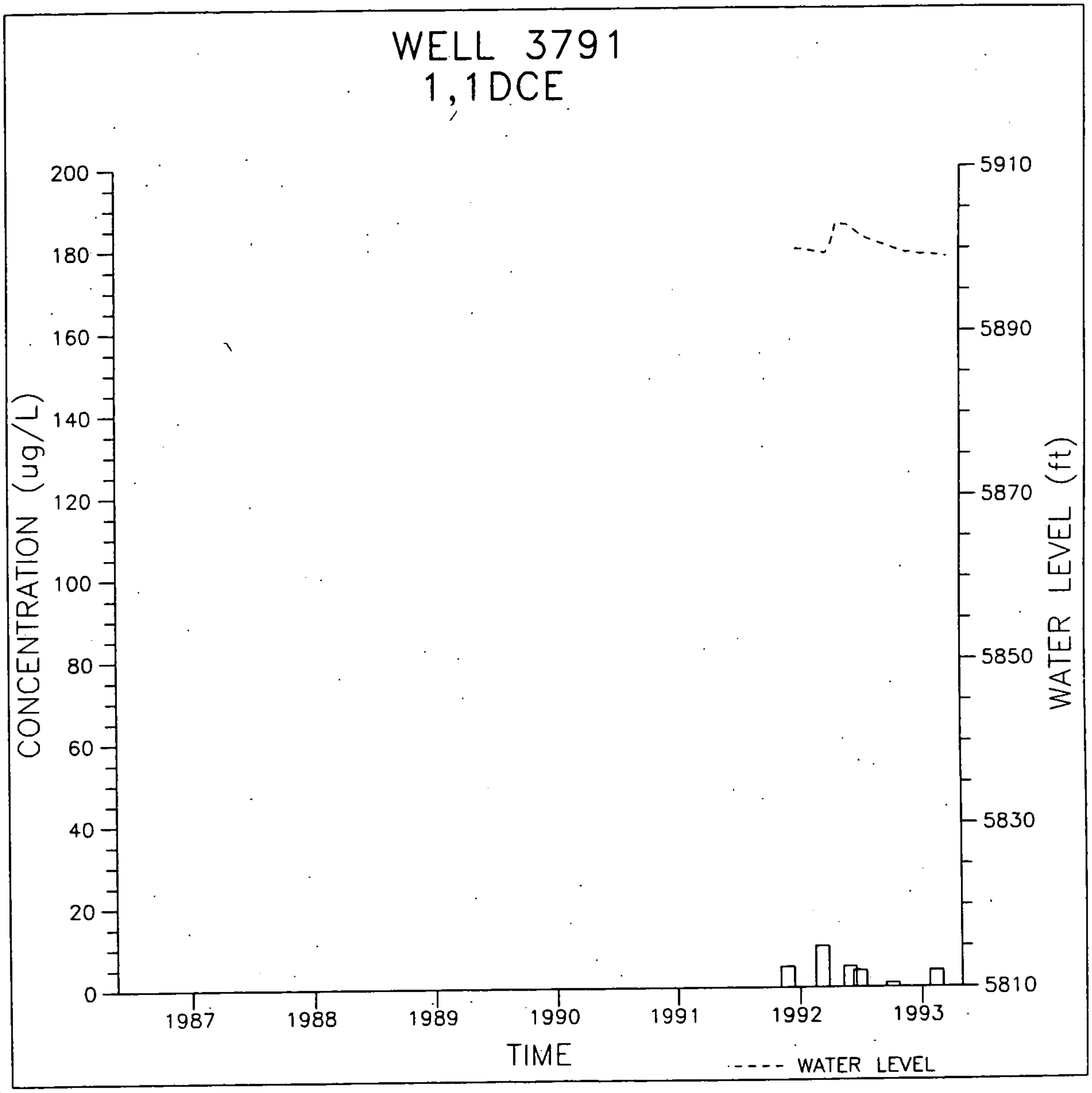
823



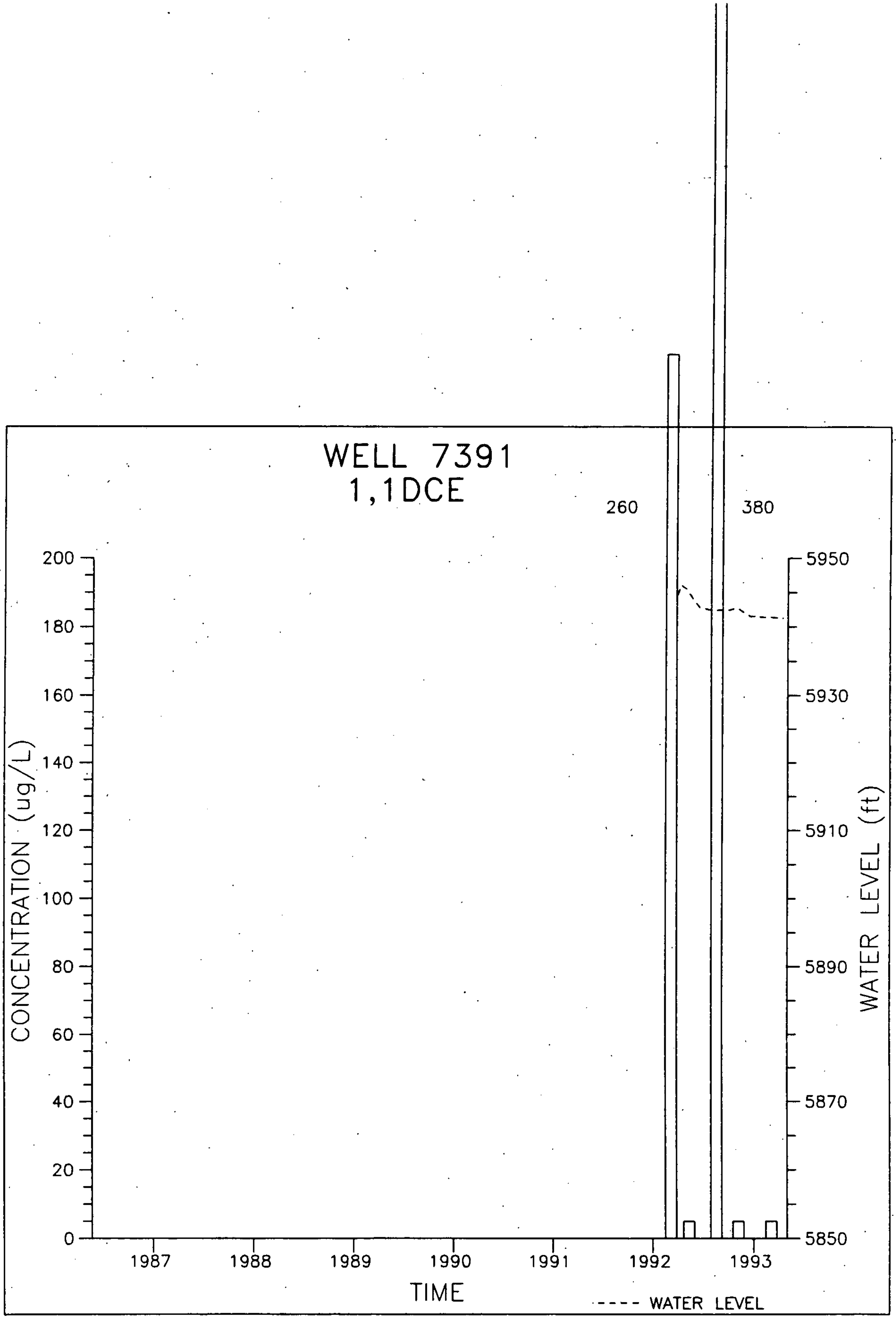
WELL P209389
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5970
5950
5930
5910
5890
5870
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

832

8854


WELL 3791
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5910
5890
5870
5850
5830
5810
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

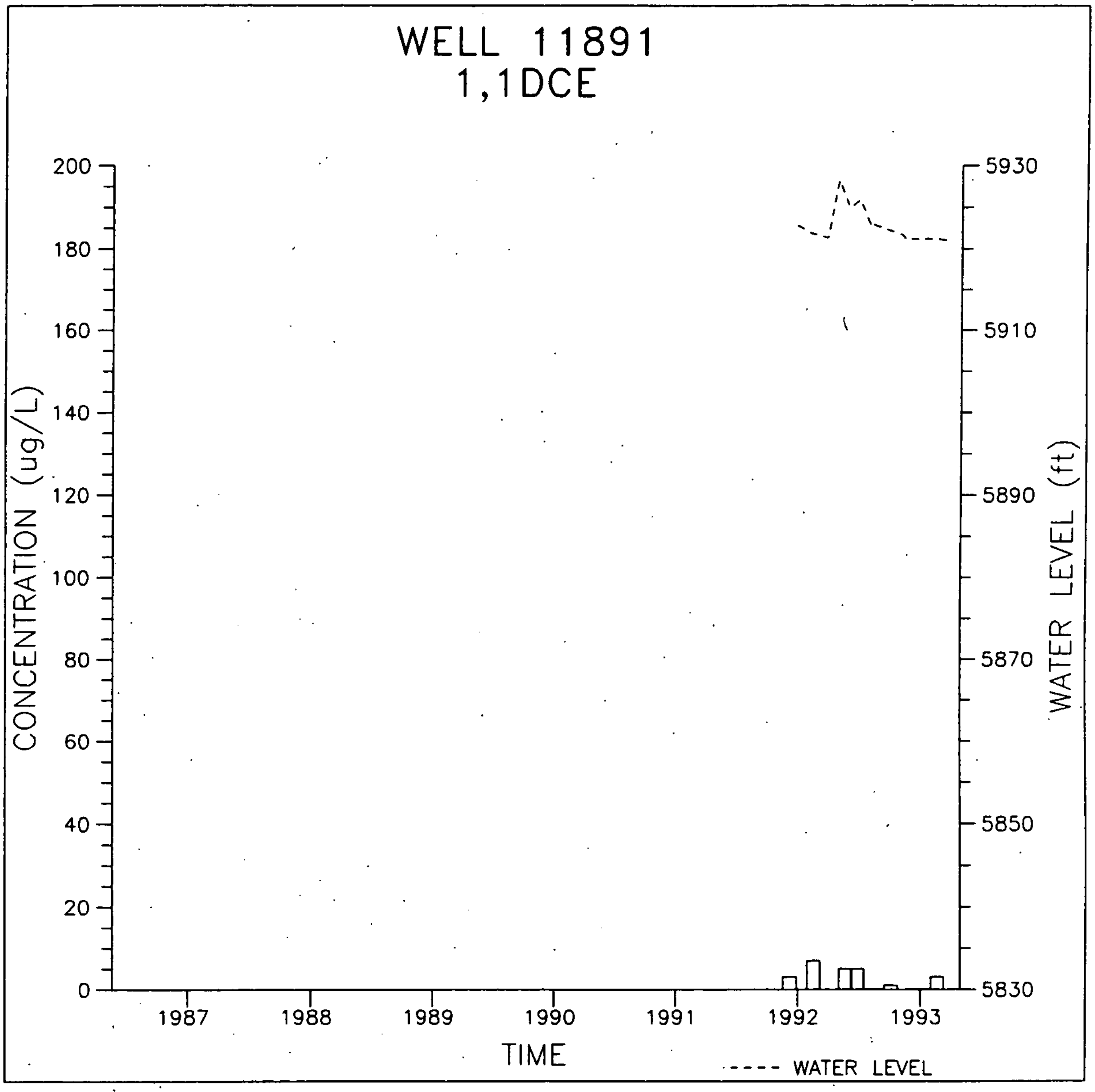
833



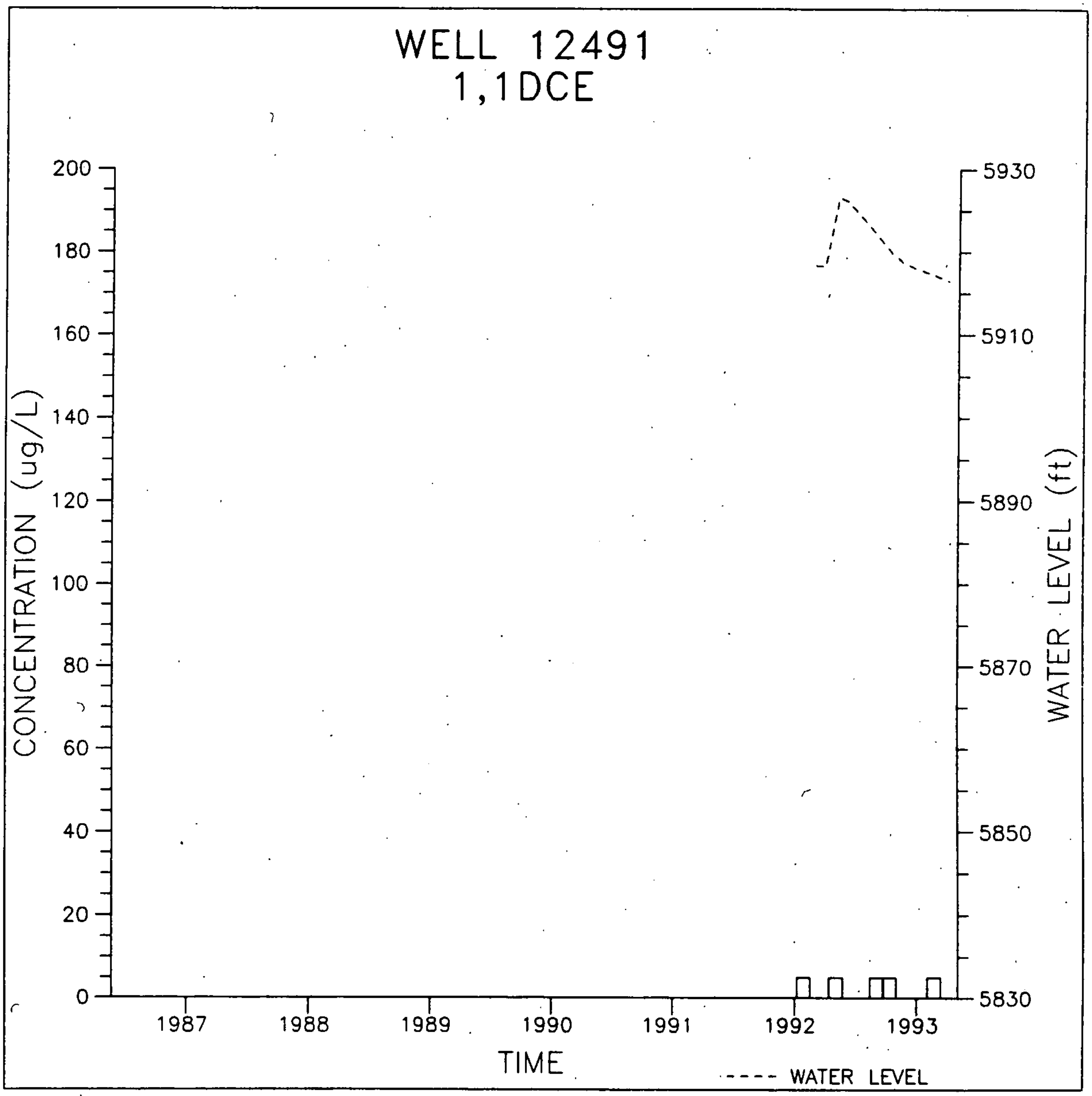
WELL 7391
1,1DCE
260
380
200
180
160
140
120
100
80
60
40
20
0
CONCENTRATION (ug/L)
5950
5930
5910
5890
5870
5850
WATER LEVEL (ft)
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

834

836

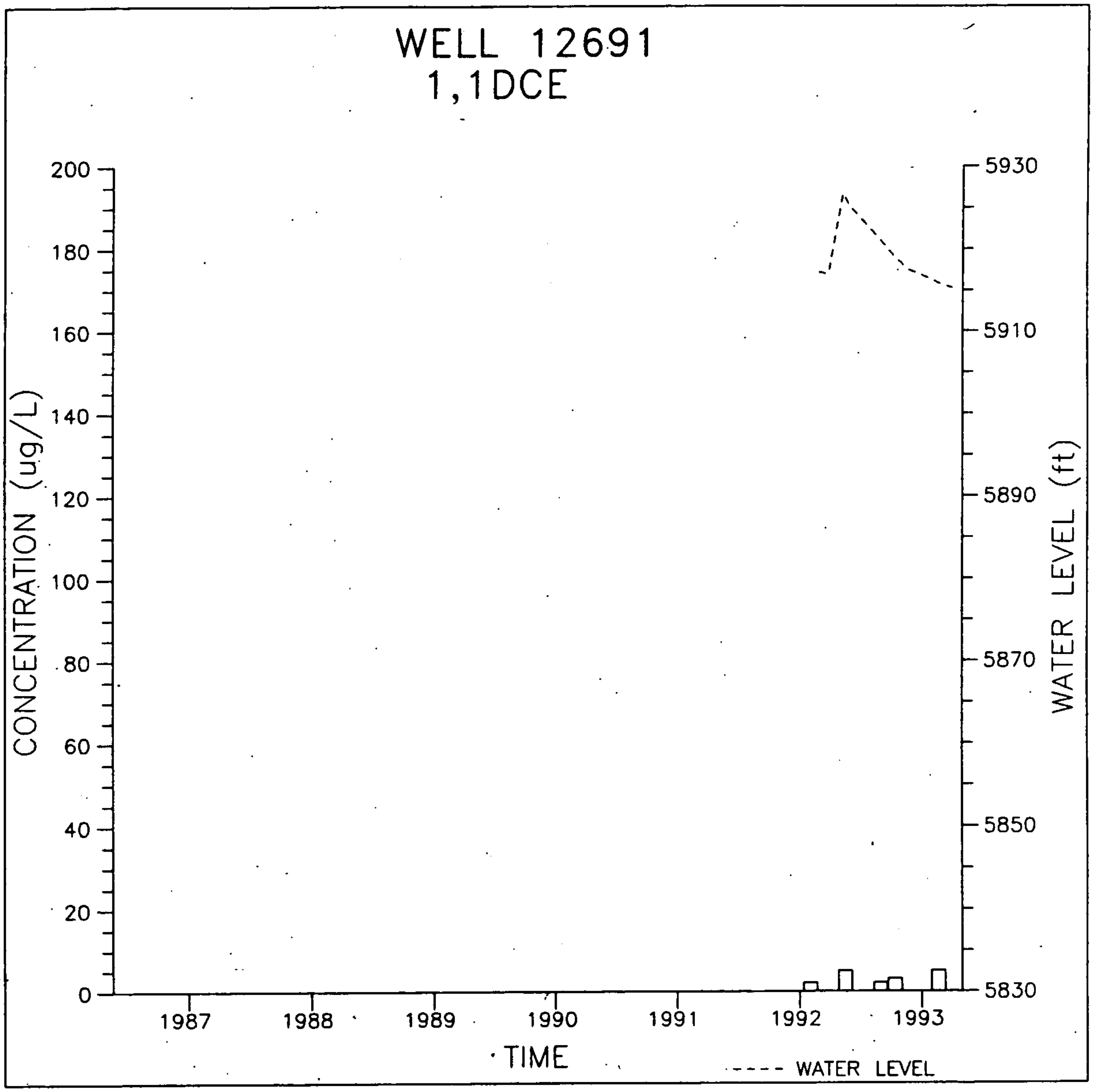

WELL 11891
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
---- WATER LEVEL

835



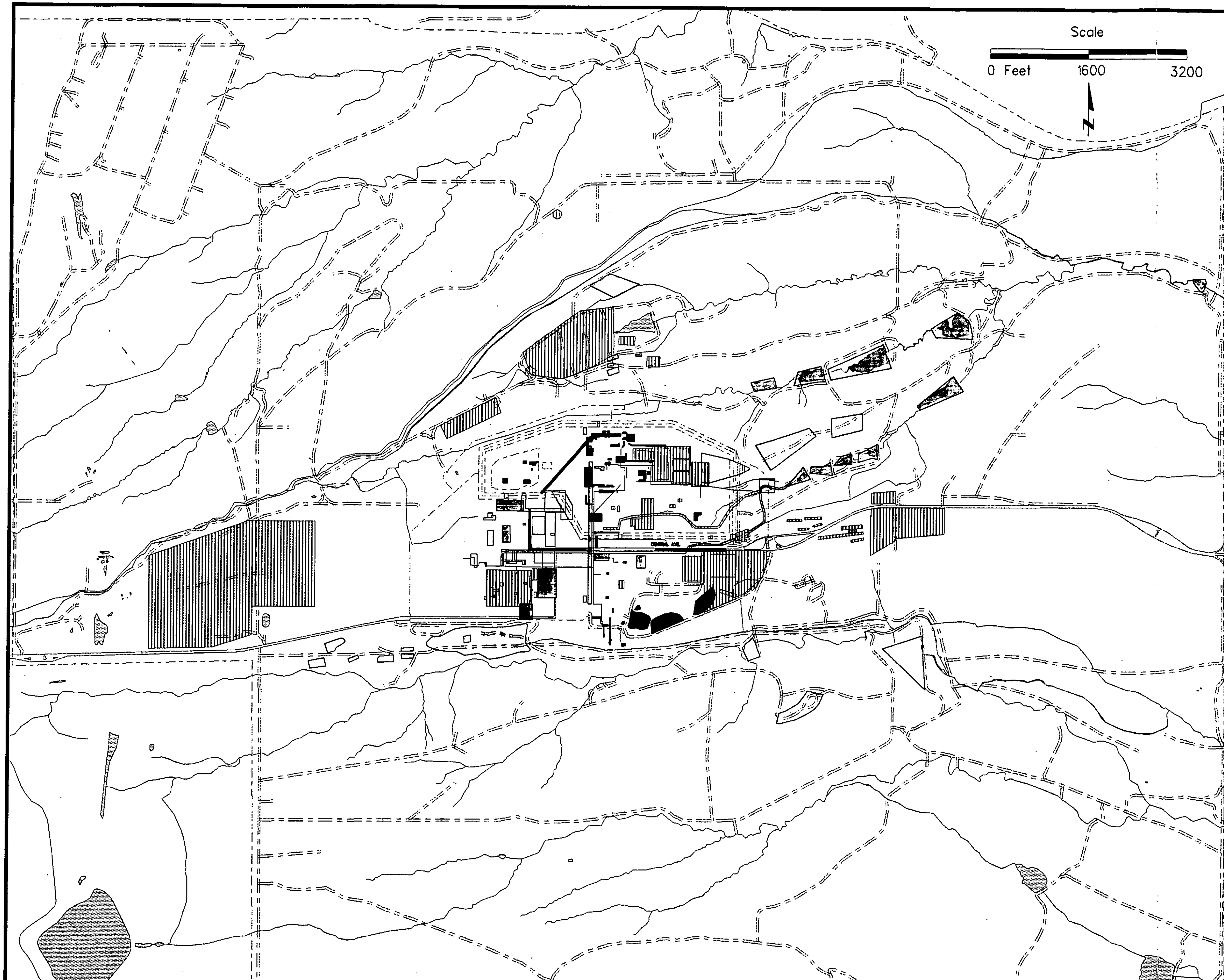
838/838

836/836



WELL 12691
1,1DCE
CONCENTRATION (ug/L)
200
180
160
140
120
100
80
60
40
20
0
WATER LEVEL (ft)
5930
5910
5890
5870
5850
5830
1987
1988
1989
1990
1991
1992
1993
TIME
WATER LEVEL

839



EXPLANATION

- IHSS's within Operable Unit 1
- IHSS's within Operable Unit 2
- IHSS's within Operable Unit 4
- IHSS's within Operable Unit 5
- IHSS's within Operable Unit 6
- IHSS's within Operable Unit 7
- IHSS's within Operable Unit 8
- IHSS's within Operable Unit 9
- IHSS's within Operable Unit 10
- IHSS's within Operable Unit 11
- IHSS's within Operable Unit 12
- IHSS's within Operable Unit 13
- IHSS's within Operable Unit 14
- IHSS's within Operable Unit 15
- IHSS's within Operable Unit 16
- Surface Water Impoundment
- Central Avenue
- Dirt Road
- Streams and Drainages
- Industrial Area

EG&G ROCKY FLATS

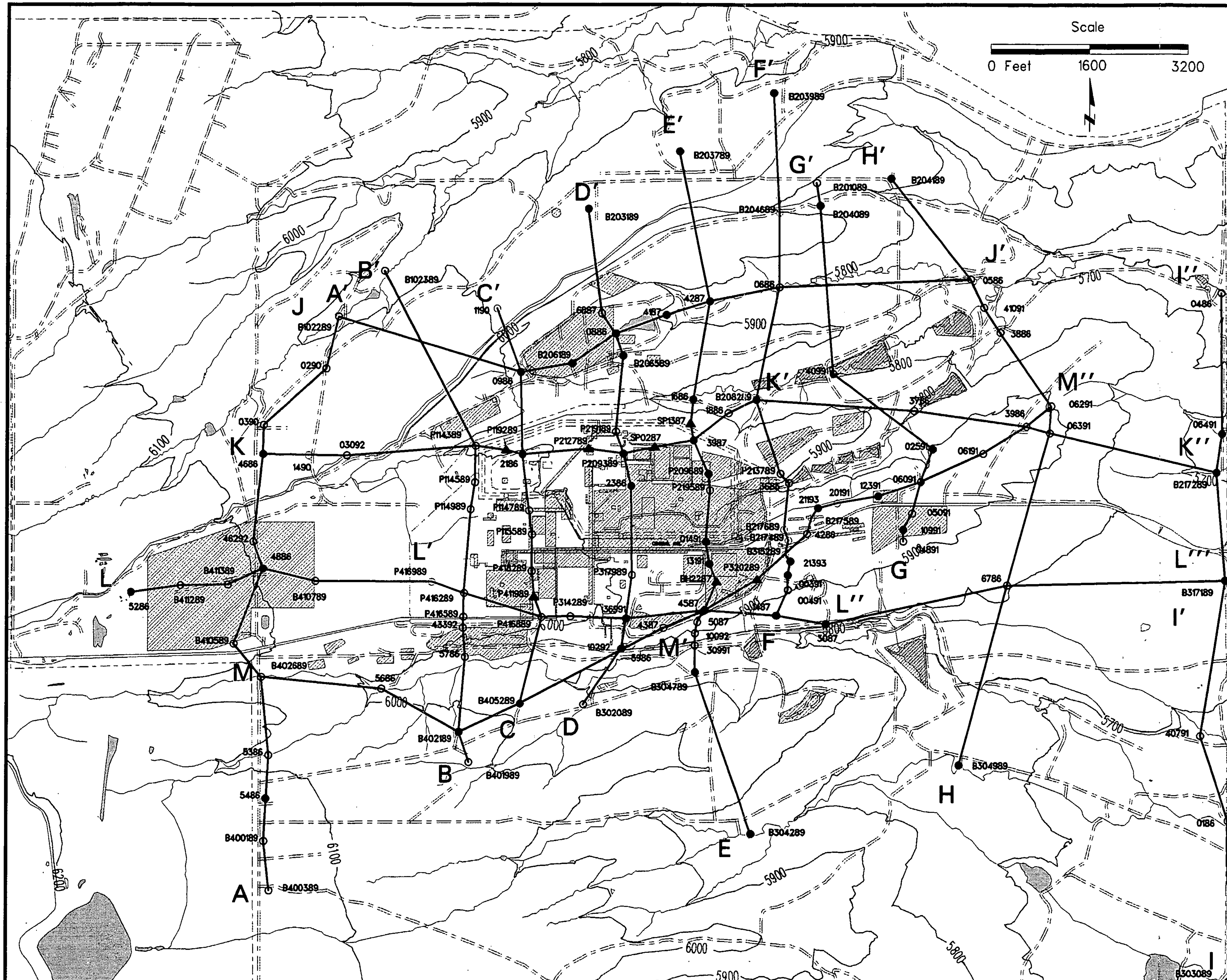
Rocky Flats Plant, Golden, Colorado

Individual Hazardous Substance Sites within OU's at Rocky Flats Plant

Well Evaluation Report
April 1994

Figure 1-2

28



EXPLANATION

Cross Section Location Line

Alluvial Well

Currently Inactive Alluvial Well

Abandoned Alluvial Well

Alluvial/Bedrock Well

Bedrock Well

Currently Inactive Bedrock Well

Abandoned Bedrock Well

Borehole

Individual Hazardous Substance Site (IHSS)

Surface Water Impoundment

Central Avenue

Dirt Road

Streams and Drainages

Topographic Contour

Industrial Area

EG&G ROCKY FLATS

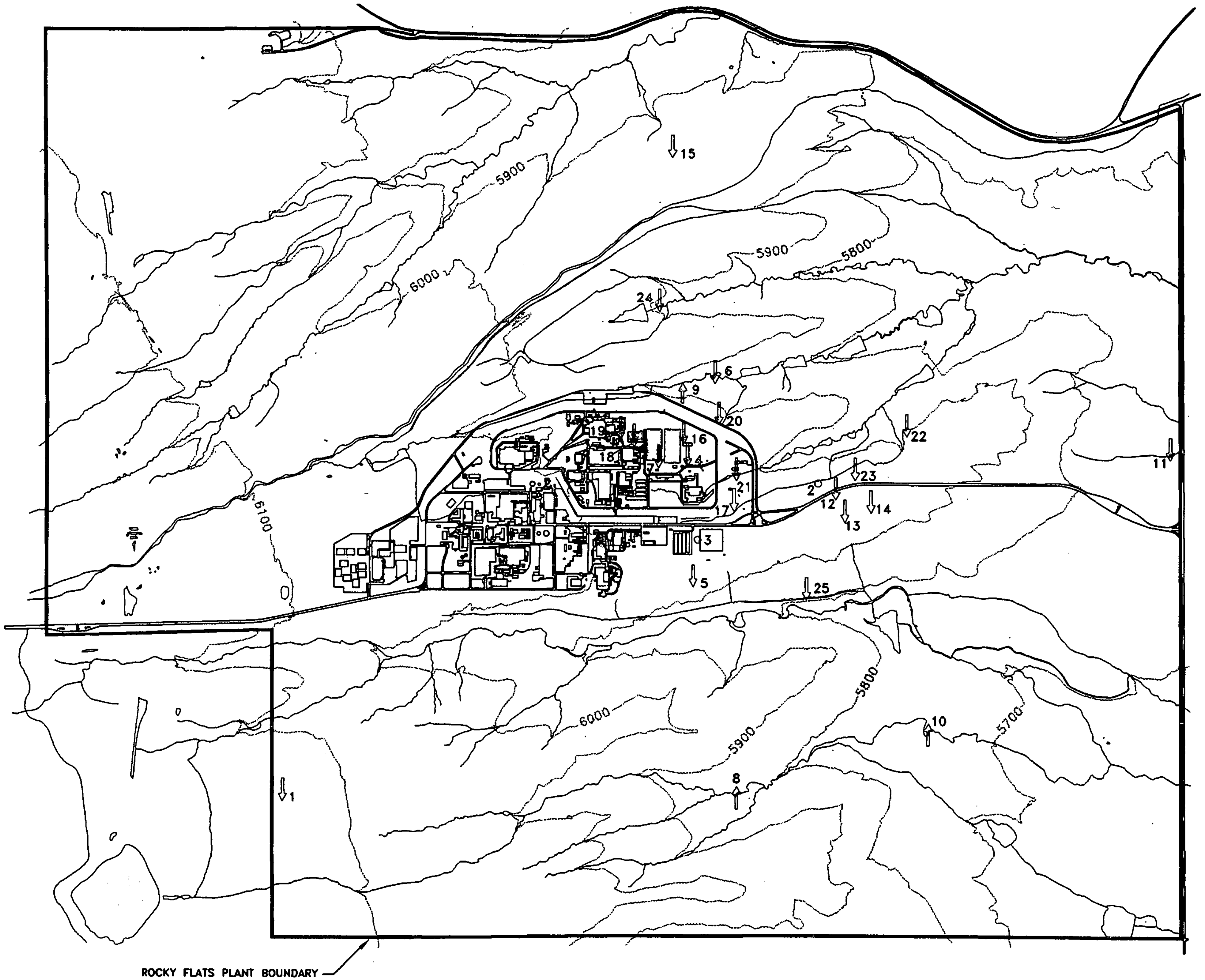
Rocky Flats Plant, Golden, Colorado

Locations of Hydrogeologic Cross Sections

Well Evaluation Report

April 1994

Figure 2-2



EXPLANATION

WELL CLUSTER/GROUP LOCATION AND REFERENCE NUMBER

15 DOWNWARD VERTICAL GRADIENT BETWEEN DEPTH-DISCRETE SCREEN INTERVALS

10 UPWARD VERTICAL GRADIENT BETWEEN DEPTH-DISCRETE SCREEN INTERVALS

o3 NO APPARENT VERTICAL GRADIENT

STREAMS AND DITCHES

6100 TOPOGRAPHIC CONTOUR

-N-

0 1000 2000

FEET

EG&G ROCKY FLATS
Rocky Flats Plant, Golden, Colorado

VERTICAL GRADIENTS MEASURED AT WELL CLUSTER LOCATIONS

Well Evaluation Report

Date: April 1994	Figure 2-3

63

Table 3-1

Required Sampling and Analyses for Active Wells*

Proposed Well Classification	Well ID	Well Status	TCL VOA (CLP)	VOA (524.2)	TCL BNA (CLP)	TCL Pest/PCB (CLP)	Methoxychlor	Endrin	Lindane	Toxaphene	2,4-D	2,4,5-TP	TAL Metals (CLP)(unfiltered)	TAL Metals (CLP)(filtered)	Cesium (filtered)	Lithium (filtered)	Molybdenum (filtered)	Strontium (filtered)	Tin (filtered)	Water Quality Parameters	pH	Cation/Anion Balance	TDS	Carbonate	Bicarbonate	Chloride	Sulfate	NO3/NO2 (as N)	Ammonia (as NH3)	Cyanide	Orthophosphate	COD	TOC	Gross Alpha (filtered)	Gross Beta (filtered)	U-233,234 (filtered)	U-235 (filtered)	U-238 (filtered)	Pu-239,240 (unfiltered)	Am-241 (unfiltered)	Pu-239,240 (filtered)	Am-241 (filtered)	Cs-137 (filtered)	Sr-89,90 (filtered)	Ra-226 (filtered)	Ra-228 (filtered)	Tritium (unfiltered)	Rad Screen (unfiltered)	TOX	Comments
Boundary -AIP	0186	active		Q										Q						Q								Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q		Chronically dry
Boundary -AIP	0386	active		Q										Q						Q								Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q		
RCRA-C	0786	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	0885	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	0985	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	1086	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	1386	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	1486	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	1585	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	1686	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	1786	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	1886	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
CERCLA	1986	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	2186	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	2286	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	2385	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	2485	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
RCRA-C	2585	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	2685	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	2785	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	2985	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
RCRA-S	3085	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	3185	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
RCRA-C	3285	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	3385	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	3485	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	3585	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	3685	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	4685	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	4785	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	4885	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	4985	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	5086	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	5186	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	5285	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	5686	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
CERCLA	6186	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	2187	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	2287	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	3887	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	3987	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	4087	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	4187	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	4287	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	5687	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	5887	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	6087	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	6187	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia (replaces 6287)
RCRA-C	6487	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	6587	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	6687	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	6887	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	7087	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	7187	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	7287	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 106089	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	B 110889	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	B 110989	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	B 111189	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
CERCLA	P 114389	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 114489	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 114589	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 114689	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 114789	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.

Table 3-1

Required Sampling and Analyses for Active Wells*

Proposed Well Classification	Well ID	Well Status	TCL VOA (CLP)	VOA (524.2)	TCL BNA (CLP)	TCL Pest./PCB (CLP)	Methoxychlor	Endrin	Lindane	Toxaphene	2,4-D	2,4,5-TP	TAL Metals (CLP)(unfiltered)	TAL Metals (CLP)(filtered)	Cesium (filtered)	Lithium (filtered)	Molybdenum (filtered)	Strontium (filtered)	Tin (filtered)	Water Quality Parameters	pH	Cation/Anion Balance	TDS	Carbonate	Bicarbonate	Chloride	Sulfate	NO3/NO2 (as N)	Ammonia (as NH3)	Cyanide	Orthophosphate	COD	TOC	Gross Alpha (filtered)	Gross Beta (filtered)	U-233,234 (filtered)	U-235 (filtered)	U-238 (filtered)	Pu-239,240 (unfiltered)	Am-241 (unfiltered)	Pu-239,240 (filtered)	Am-241 (filtered)	Cs-137 (filtered)	Sr-89,90 (filtered)	Ra-226 (filtered)	Ra-228 (filtered)	Tritium (unfiltered)	Rad Screen (unfiltered)	TOX	Comments
CERCLA	P 114889	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 114989	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 115089	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 115489	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 115589	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 115689	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 119389	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	B 206289	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 206489	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 206589	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 206689	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 206789	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 206889	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	B 206989	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-S	B 207089	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia
RCRA-C	B 207289	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			State Landfill regulations also require analysis of COD, TOC, & ammonia (chronically dry)
RCRA-S	P 207389	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 207589	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 207689	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 207789	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 207889	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 207989	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 208089	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 208189	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 208289	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 208389	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
RCRA-C	B 208489	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			chronically dry
RCRA-C	B 208689	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaced by Well B210389
RCRA-C	P 208889	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 208989	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	P 209089	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209289	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209389	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209489	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209589	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209689	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	P 209789	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	P 209889	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	P 210089	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	P 210189	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well P209189
RCRA-C	B 210489	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well B208589
CERCLA	P 213689	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	B 213789	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	B 213889	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	B 213989	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 215789	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 218289	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	P 218389	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
CERCLA	P 219189	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	P 219489	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	P 219589	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
CERCLA	P 313489	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 313589	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 314089	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 314289	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
RCRA-C	B 410589	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	B 410689	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-S	B 410789	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 411289	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	B 411389	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
CERCLA	P 414189	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 415889	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 415989	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416089	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.

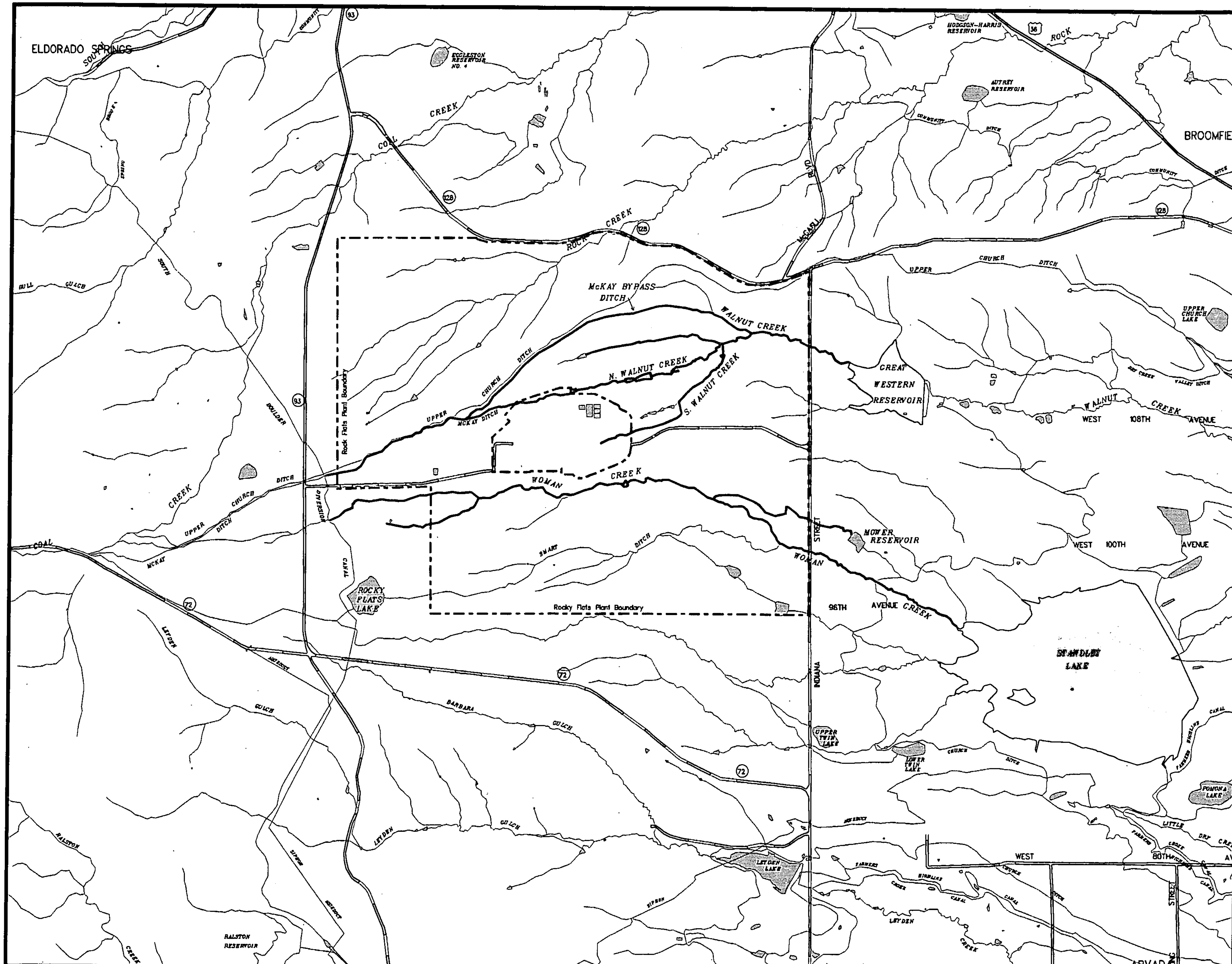
Table 3-1

Required Sampling and Analyses for Active Wells*

Proposed Well Classification	Well ID	Well Status	TCL VOA (CLP)	VOA (524.2)	TCL BNA (CLP)	TCL Pest./PCB (CLP)	Methoxychlor	Endrin	Lindane	Toxaphene	2,4-D	2,4,5-TP	TAL Metals (CLP)(unfiltered)	TAL Metals (CLP)(filtered)	Cesium (filtered)	Lithium (filtered)	Molybdenum (filtered)	Strontium (filtered)	Tin (filtered)	Water Quality Parameters	pH	Cation/Anion Balance	TDS	Carbonate	Bicarbonate	Chloride	Sulfate	NO3/NO2 (as N)	Ammonia (as NH3)	Cyanide	Orthophosphate	COD	TOC	Gross Alpha (filtered)	Gross Beta (filtered)	U-233,234 (filtered)	U-235 (filtered)	U-238 (filtered)	Pu-239,240 (unfiltered)	Am-241 (unfiltered)	Pu-239,240 (filtered)	Am-241 (filtered)	Cs-137 (filtered)	Sr-89,90 (filtered)	Ra-226 (filtered)	Ra-228 (filtered)	Tritium (unfiltered)	Rad Screen (unfiltered)	TOX	Comments
CERCLA	P 416189	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416289	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416389	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416489	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416589	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416689	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416789	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416889	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 416989	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
CERCLA	P 419689	active																																																IOU Characterization Well. No Sampling and Analysis Plan (i.e. specific analytical suite) has been approved.
NL	00190	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				
NL	00290	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				
NL	00390	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				
NL	01490	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				
Boundary - AIP	6491	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		Q		
Boundary - AIP	40491	active		Q	1	1								Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q		Q		chronically dry
Boundary - AIP	40791	active		Q	1	1								Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q		Q		chronically dry
Boundary - AIP	41491	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
Boundary - AIP	41591	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
Boundary - AIP	41691	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
CERCLA	45391	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
NL	03092	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				chronically dry
NL	03192	active	Q				Q	Q	Q	Q	Q	Q		Q								Q		Q	Q	Q	Q	Q	Q			Q	Q	Q	Q										Q	Q				chronically dry
CERCLA	10092	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
CERCLA	10192	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
CERCLA	10292	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
CERCLA	10392	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
CERCLA	10492	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
CERCLA	10592	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
CERCLA	10692	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
CERCLA	10792	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
CERCLA	10892	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	chronically dry
CERCLA	10992	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
CERCLA	11092	active		Q										Q						Q								Q		Q	Q			Q	Q	Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	M	
RCRA-S	46192	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Wells 1081 and 0782
RCRA-C	46292	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			
RCRA-C	00393	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well 6787
RCRA-C	00493	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well B206389
RCRA-S	05093	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well 2886
RCRA-S	05193	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well 3787
RCRA-S	05293	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces Well P207489
RCRA-S	05393	active	Q											Q	Q	Q	Q	Q	Q		Q		Q	Q	Q	Q	Q	Q		Q				Q	Q	Q	Q	Q			Q	Q	Q	Q	Q	Q	Q			replaces well P210289

RCRA-C = RCRA monitoring wells - information used to "determine the rate and extent of migration of hazardous waste or hazardous waste constituents in the ground water." (40 CFR 265.93 (d)(4)(i))
RCRA-S = RCRA monitoring wells used for RCRA statistical comparisons
Boundary - AIP = Boundary monitoring wells currently required (by CDH) to be sampled and analyzed
NL = Pre-permit monitoring wells for the new landfill
CERCLA = Wells specified in CERCLA OU RI work plans
Q = Quarterly Monitoring
M = Monthly Monitoring
1 = Monitored for 1 Quarter only
IOU = Integrated Operable Unit - These wells will be used to characterize the industrial area for an IM/IRA study, and will be retained as "Plant Protection" wells after serving as CERCLA characterization wells.

* SOURCE OF INFORMATION:
RCRA-C & RCRA-S: Final Ground Water Assessment Plan (EG&G, 1993)
Boundary - AIP: Agreement in Principal (D.O.E./State of Colorado, 1989)
NL: Groundwater Monitoring Plan for the New Sanitary Landfill (EG&G, 1993)
CERCLA: Groundwater Sample Request Form (EG&G Internal document, 9/17/93)



EXPLANATION

- Streams and Drainages
- Plant Boundary
- Primary Roads
- Secondary Roads
- Surface Water Impoundment
- Segment 5
- Segment 4
- Segment 3
- Segment 2

0 Miles 1 2

0 Feet 4500 9000

Scale 1" = 4500'

EG&G ROCKY FLATS

Rocky Flats Plant, Golden, Colorado

Big Dry Creek Stream Segments

Well Evaluation Report
April 1994

Figure 3-2